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REPORT

OF THE

COMMISSIONER OF PATENTS

FOR THE YEAR 1852.

PART II.

AGRICULTURE.

CONTENTS.

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WASHINGTON:
ROBERT ARMSTRONG, PRINTER.
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1853.

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LETTER

FROM

THE COMMISSIONER OF PATENTS,

TRANSMITTING

His Annual Report.

MARCH 2, 1853.—Laid upon the table, and ordered to be printed.

ARCH 3, 1853.—Ordered that 110,000 extra copies of the Agricultural, and 60,000 extra of the Mechanical part be printed; 10,000 of each of which are for the use of the Patent Office.

UNITED STATES PATENT OFFICE,
February 28, 1853.

SIR: I have the honor of transmitting to you the Agricultural part of the Annual Report required by law from this Office.

It would have been gratifying to have given a new character to the work, and to have made it such as would better satisfy the wants and the tastes of the best informed among those for whom it is especially intended. Soon after entering upon the duties of this Office, I made strenuous efforts to have this effected; but directly found that no competent person would undertake such a task at so late a period. It has, in fact, cost more than usual efforts to have it completed in the present form, even at this late stage of the session.

The arrangements for obtaining seeds had also been perfected when I came. Measures should be taken hereafter to secure their being delivered at an earlier day, so that they may be distributed in season for the Southern portions of the country.

Very respectfully, your obedient servant,

SILAS H. HODGES.

Hon. LINN BOYD,
Speaker of the House of Representatives.

I.

AGRICULTURE AND AGRICULTURAL EDUCATION.

PROGRESS OF AGRICULTURE IN THE UNITED STATES.

BY DANIEL LEE, M. D.

Agriculture gives employment to more capital and labor in the United States than all other pursuits combined; and its progress marks, in a peculiar manner, the advancement of the republic in wealth, civilization, and power. The natural fruitfulness of the American soil, its vast area, and wide range of climates, between the gulf and the great lakes, the Atlantic and the Pacific oceans, present for consideration resources and capabilities almost unlimited in extent and quite inestimable in value. We shall not attempt to do more than point out the direction in which American tillage and husbandry are making such rapid progress, and indicate the probable result of our present system of farm economy, if steadily pursued to the close of the present century.

In 1821 there were exported from the United States 124,893,405 pounds of cotton. In 1849 the export was 1,026,602,269 pounds. These figures show an increase of more than 800 per cent. in 28 years in the surplus production of the most important commercial staple of the country and the world. At this time an average crop of cotton may be estimated at 3,000,000 bales, of 400 pounds each; and the prospect is that the demand will equal, if it does not exceed, the supply for many years. Hence the production of this article is destined to increase much faster than population; for, as civilization and commerce extend, the number that will consume cotton fabrics, and the annual consumption of each person, by reason of his greater productive power, will extend in a still greater ratio; in other words, the same causes that increased the foreign demand for American cotton more than 800 per cent. in 28 years, will augment the amount now exported 300 per cent. in the next quarter of a century.

Fortunately we have the land and climate most desirable for the annual growth of 9,000,000 bales, and we shall probably have the labor and capital needed for the economical production of such crops. At a half bale per acre, only 18,000,000 acres would be planted to realize the crop named; while the four States of Georgia, Alabama, Mississippi, and

Texas, contain four times that number of acres of choice cotton lands. Without some unforeseen and improbable event, the exportation of cotton will steadily and rapidly increase until its value reaches three hundred million dollars per annum. It is as unlikely that the vascular tissue of flax or hemp will ever supersede the cellular tissue of cotton for the cheap production of desirable clothing, as that loaves of baked clay will serve as a substitute for loaves of bread in feeding the human family. There is an organic difference between the fibres of cotton and flax, in favor of the former, that can no more be changed than iron can be transmuted into gold. Nevertheless, great improvements in the preparation and manufacture of flax are doubtless attainable, as they are certainly desirable.

Cotton culture presents one feature which we respectfully commend to the earnest consideration of southern statesmen and planters, and that is the constantly increasing deterioration of the soil devoted mainly to the production of this important crop. Already this evil has attained a fearful magnitude; and, under the present common practices, it grows a little faster than the increase of cotton bales at the South. Who can say when or where this ever-augmenting exhaustion of the natural resources of the cotton-growing States is to end short of their ruin? Every year's labor in tillage renders the existing impediments, in the way of adequate restitution to the injured soil, more difficult to be overcome; and if the depleting policy be much longer pursued, with the rapid increase of field-hands and mules, deeper ploughing, and greater facilities for sending cotton to market, to what future resources can the community look for manure enough to recuperate all the impoverished land in the planting States?

No cotton-grower should wish to conceal from himself or the public the fact that the soil of the South will be injured as much in the next fifteen years as it has been in the last twenty-five; while the means of renovation in cultivated fields, fifteen years hence, will be less than half what they now are. If, in practice, it is now found somewhat difficult to give back to cotton plantations a fair equivalent for the elements of crops, removed by the leaching and washing of many sudden showers and heavy rains falling upon light and thoroughly or poorly-tilled land, can it be easier to make restitution after many million tons of the few precious atoms extracted in the growth of agricultural plants have been either wasted at home or sent to distant States and countries for consumption? If a wise and skilful planter finds it apparently impracticable to export largely the raw material of crops drawn from the surface of his fields, and not impair their fruitfulness, when they are rich in the elements of cotton and grain, who can do any better by these same fields after they have been partially or wholly exhausted? If adequate restitution is ever to be made, who does not see that every year's delay to begin the great work lessens the resources of every owner of the soil, while it augments the necessities of all arated land? In case no restitution is contemplated, and the present system of planting is to continue, what a humiliating and inglorious destiny must not the sunny South finally reach? Can her patriotic statesmen close their eyes against the evidence of an erroneous policy which impoverishes the soil, because full and perfect restitution appears impracticable? Our old colonial system of agriculture is defective and wrong in the extreme. Having come down to us from before the Revolution, the evils which are entailed admit of no remedy short of wise and timely legislation. Isolated cultivators are entirely powerless

to change a public policy that has grown up with the growth of six or eight generations, whose uniform practice has been to take everything from the virgin earth and give nothing back. This great error is by no means limited to the cotton and tobacco-growing States. It exists in New England, New York, Pennsylvania, Ohio, and all the other States, and will lead to precisely the same results as at the South. The difference in climate makes a corresponding difference in degree and in the length of time that the natural fertility of land will last; but in the end a common system will lead to a common result in all parts of the republic.

It would gratify our self-esteem, as owners of the soil which we cultivate, to conceal our short-comings in reference to its obvious wants, and dwell upon the statistics that prove our ability to extract more of the agricultural staples of the country from its arable lands than an equal number of laborers ever before extracted. By the aid of better farm implements, greater experience, and more skilful operatives, cotton, corn, wheat, and tobacco are grown very cheaply on rich lands; and if all of the so-called improved farms were really fertile and exempt from the loss of the essential constituents of crops, American agriculture would soon approximate perfection. As an *art*, it has made wonderful progress in the last thirty years: but as a *science*, we have yet to plant the seed; and, what is worse, the ground has to be grubbed, and ploughed, and manured, before the germs of rural science can thrive in American soil. Agricultural statistics show this, and we shall appeal to them to prove both the advancement of tillage and husbandry as arts, and their deplorable condition as sciences

American agriculture as an art.

In the *art* of subduing wild lands, whether forest or prairie, American farmers have no equals. The census of 1840 did not ascertain the number of acres of improved land in the United States; therefore, there are no data showing the increase during the last decade. Corn, being the most important and universal crop grown, is the best test of the progress of the art of tillage in all parts of the Union. In 1840, the returns of this cereal were 377,531,875 bushels; in 1850 they were 592,141,230. These figures indicate a gain of over 50 per cent., while population increased only about 35 per cent. in the same length of time. The crop of wheat would have shown an equal advance, had it not been very badly damaged before the harvest from which the census of 1850 was made. To our knowledge, this staple has been raised in some States, and sold at from twenty-five to fifty cents a bushel, during the last thirty years. Since the discovery of the gold deposites of California, and the partial exhaustion of the best wheat lands in the country, the price of this crop has advanced considerably in all the newly settled districts. In no other nation can wheat and maize be grown at so small an outlay in the labor of man and beast as in the United States. This advantage, which extends to cotton and tobacco culture, and the production of hay, is to be ascribed mainly to the circumstance of the comparative scarcity of labor in this country of cheap farming lands since the first settlement of the British colonies. A demand for labor beyond the supply has operated as a standing bounty on improved agricultural implements, and

extraordinary skill in every manipulation practised in rural affairs; and the natural result is unrivalled attainments in the arts of tillage and husbandry. The same amount of toil of a man and horse which will produce a bushel of wheat in England, will yield ten bushels of corn on good land in this country. Hence it is that our annual crop of maize now exceeds six hundred million bushels. We have often had occasion to admire the tact, skill, and industry with which over three thousand million pounds of seed-cotton are picked by human fingers, in a harvest of a few months' duration. Both cotton and corn are grown in many countries, and where labor is much cheaper than in the United States; but one travels in vain to find a people whose knowledge of the *art* of cotton and corn-planting approaches that of the citizens of this republic.

Productiveness of crops and destructiveness of soil are the two most prominent features of American agriculture. The latter feature arises from the fact that we have a continent to cultivate and exhaust of its virgin fertility. Long experience has taught us all the advantages of this American system; its disadvantages have been sadly overlooked. They consist in compelling all classes to give an ever-increasing amount of labor in all the older States for their daily food and necessary clothing. Railroads and canals extending into the heart of fresh lands, temporarily abate the evil named, and inspire a false confidence in the popular policy of the age. If we will take the time required to master the true principles of rural economy, and the statistics of tillage, as they affect *the soil*, we shall find abundant evidence of the great and almost irreparable injury done to one hundred million acres of our so-called "improved lands." The number of acres returned at the census of 1850 was 118,435,178 "improved," and 184,596,025 "unimproved." It is only in two or three States, where State statistics aid us in our researches, that the constant deterioration of the soil is demonstrated. The object sought by those that prepared the blank schedules for the collection of agricultural statistics by the United States marshals, appears not to have been to promote the interests of agriculture by improving the soil, but to benefit inland and foreign commerce, trade, and manufactures, which look to the products of rural industry, not to its influence on the enduring fruitfulness of the earth. The careful and critical study of agriculture, with a view to make it the foundation of a wise system of political economy, has never been undertaken by American statesmen. Hence, their statesmanship and political economy have been at war with the true principles of tillage and husbandry from the first settlement of this continent by Europeans. Instead of inculcating the public duty to feed the land, that both feeds and clothes all classes and all generations, they have taught doctrines and established a policy which render it wholly impracticable to supply cotton, tobacco, and grain, for home consumption, without seriously impairing the natural resources of the soil. The truth of this remark we will now proceed to demonstrate: All will admit that the farmers of New York have the benefit of canals, railways, plank roads, cities, villages, and home markets.

With these advantages, it has been assumed that no further aid to agriculture was necessary, except such as the free schools, academies, and colleges now established would furnish. Since the State census of 1845, New York farmers have had the best services of a popular and

powerful State agricultural society, of a local society in nearly every county, of numerous and widely circulated agricultural journals; and they have enjoyed all the assistance that cities and villages can give to the cultivators of the soil.

In 1845 there were 11,737,968 acres under improvement in that State; in 1850 the number had increased to 12,408,968. Gain in five year 671,692 acres. If the land neither increased nor decreased in fertility, the crops, neat stock, horses, swine, and sheep should have gained in the same ratio with the increased area brought under cultivation. If the land yielded more food for man and his domesticated animals per acre in 1850 than it did in 1845, then it would have increased in productiveness; but if it produced less, the legitimate inference is that it must have parted with more of the essential elements of crops than it regained.

The number of horses in the State in 1845 was 505,155; in 1850 it was 447,014; showing a decrease of 58,141 in five years. In these five years a large number of horses was brought into the State and sold in the growing cities of New York, Brooklyn, Albany, Troy, Utica, Syracuse, Auburn, Rochester, and Buffalo. The decrease of horses in the farming districts must have been not far from 100,000, instead of an increase proportionate to the increased number of acres of improved land.

In 1845 there were 999,490 cows milked in the State, and in 1850 931,324; showing a decrease of 68,066, in place of a gain, as there should have been had the soil not been deteriorated, and with 58,141 less horses to feed, and 671,692 acres of land more for dairy purposes.

Of other cattle there were 1,072,840 in 1845, and 945,315 in 1850; showing a decrease of 127,525, in place of a gain.

Of swine there were 1,584,344 in 1845, and in 1850, 1,018,252; showing a decrease of 566,092.

Of sheep there were 6,443,865 in 1845, and only 3,453,241 in 1850. These figures indicate the prodigious falling off in five years of 2,990,624. It would take 400,000 cows to replace all the sheep slaughtered, to say nothing of the diminished number of horses, oxen and young cattle, and swine.

Of potatoes the decrease was 7,255,056 bushels.

Of peas and beans there was a decrease of 1,182,054 bushels.

Of flax there was a decrease of 1,956,485 pounds.

Of wool there was a decrease of 3,793,527 pounds.

Of wheat there was a decrease of 270,724 bushels.

Of buckwheat there was a decrease of 450,724 bushels.

We will now name the crops in which there was an increase.

The crop of corn was 14,722,114 bushels in 1845, and 17,858,400 in 1850; increase 3,136,286 bushels. To produce the corn stated in the census of 1845, 595,135 acres were planted; indicating an average yield of 24⅘ bushels per acre. From the impoverishment of pastures and meadows, and the decrease of forage for sheep, horses, and neat stock, more acres are now planted in corn, relatively, than ten years ago. At least one-tenth of the 671,567 acres increased area of improved land in the State may be set down as planted to this excellent forage as well as grain crop. This estimate indicates an average increase of corn per acre of two bushels. In the Patent Office Report for 1849 we estimated the number of farmers in New York who are improving their lands at one-twelfth of the whole, representing about a million acres of cultivated

land. No reason to vary this estimate has since been found. One-twelfth of the corn growers, it is believed, raise an average of 50 bushels per acre, who produce 2,760,000 bushels from 55,200 acres. One-fourth of the farmers in the State so cultivate their farms as to keep them from deterioration, and of course make and apply manure, in one form or another, equal to the draughts on the land by the growth of grass, grain, and roots, and by tillage. The average crops of corn made by these men may be set down at 35 bushels per acre. They cultivate 165,573 acres in corn, and harvest 5,595,055 bushels per annum. These figures leave 441,518 acres in the hands of two thirds of the cultivators in the State, who grow 9,503,345 bushels, being an average product of 21½ bushels per acre.

Of rye there was an increase of 1,181,860 bushels. The rye crop of 1845 yielded only 9⅓ bushels per acre. If we allow one-tenth of the 671,692 acres of fresh land brought under improvement between the census of 1845 and that of 1850 to be sown with rye, and produce 15 bushels per acre, the increase would be 1,007,535 bushels, or nearly the quantity that the actual returns indicate as the gain in the State.

Similar remarks will apply with greater force to the increase of 228,163 bushels of oats; the increase of 476,354 bushels of barley; and of 26,796 tons of hay. One-tenth of the new lands in meadows would be a gain of 67,169 acres, and these, yielding 1½ ton per acre, would show an increase of over 100,000 tons, instead of 26,796. There is an increase of 264,361 pounds of butter, and one of 12,991,437 pounds of cheese. These dairy statistics are exceedingly interesting: first, because an increase of population of 494,323 in five years would lead to a corresponding increased consumption of milk before it could be used for making either cheese or butter; and, secondly, because there were nearly 100,000 less cows milked in 1850 than in 1845. In the census of 1850 dry cows were returned among the "milch cows" of the State; in the census of 1845 no cows were included except such as gave milk. These facts prove incontestably that the praiseworthy efforts of the members of the State and county societies to improve dairy stock have been eminently successful. A very considerable share of the domestic animals in New York has been increased in value within the last twelve years by the diffusion of rural knowledge among the people. The "live stock" at the census of 1850 was returned as worth $73,570,499 in that State.

The construction of numerous canals, railways, and plank roads, and the rapid growth of cities and villages, have operated to enhance the market price of farming lands in all parts of the State. So far is this increase of value from indicating a corresponding gain of the elements of fertility in the soil, that it arises solely from the power of its owners to extract these elements in crops, products of the dairy, the orchard, and the garden, and sell them at a fair price on the farm. Grain, hay, provisions, fruit, and vegetables bring prices that render farming lands valuable in New York to *wear out* by the usual system of tillage and husbandry. Two-thirds of all the improved lands in that State are damaged to the extent of at least three dollars per acre a year, involving an annual loss of $25,000,000. How to prevent this constant impoverishment of the soil in all the States is a question of vast moment to the well-being of the republic.

Before we proceed to the consideration of remedies, it is thought advisable to bring before the reader additional evidence of the extent and certainty of the malady. "To know ourselves diseased is half our cure."

The Massachusetts State Board of Agriculture has adopted the following pregnant resolution:

"*Resolved*, That the necessity of this improvement [agricultural education] is apparent from the report of the valuation committee to the last legislature; by which it will be seen that, although there have been added to the lands under improvement since 1840 more than three hundred thousand acres, and although the upland and other mowing lands have been increased more than ninety thousand acres, or nearly 15 per cent., yet the hay crops have increased only about 3 per cent., showing a relative depreciation of 12 per cent.; and although the tillage lands have been increased more than forty thousand acres in the same period, yet there has been no increase in grain crops, but an absolute depreciation of *six hundred thousand bushels;* and although the pasturage lands have been increased more than one hundred thousand acres, yet there has been scarcely any augmentation of neat cattle, while in sheep there has been a reduction of more than one hundred and sixty thousand, and in swine of more than seventeen thousand."

These facts prove that home markets, a net-work of excellent railroads, and most flourishing agricultual societies and journals, are as insufficient to teach the true principles of agriculture in Massachusetts as in New York. The practice of drawing on American soil as an inexhaustible capital prevails equally all over the United States, and it is truly bred in the bone and flesh of the people. Wherever it is possible to bring the light of truthful statistics to bear on the land under cultivation, there the consumption of its virgin fertility is demonstrated. Of the one hundred and twenty-five million acres now under cultivation in the United States, four fifths, or one hundred millions, are damaged to the extent of three dollars an acre per annum. By which remark we mean that complete restitution of the elements of crops removed, such as potash, soda, lime, magnesia, chlorine, phosphoric and sulphuric acids, and ammonia, cannot be made short of an expense of three dollars per acre. All manuring of every kind implies the necessity of making restitution to the earth cultivated by man; but this first and highest duty of the cultivator and husbandman is now almost universally neglected.

Remedies considered.

In what way can the natural resources of the soil be best preserved from injury and saved from destruction? Of all problems in agriculture the one just stated is the most important, and perhaps the most difficult to solve. Public sentiment, and the moral sense of the people everywhere, assume the right to extract from the surface of the earth its elements of bread, meat, wool, flax, hemp, cotton, and tobacco, and waste them at home or export them abroad, never to return. These elements of crops, of which a cubic foot of common soil contains about one part in a thousand in an available form, are now being extracted and wasted in cities and elsewhere, as fast as five million laborers and five thousand million dollars capital can well perform the task. Commerce, trade, the mechanic arts, and manufactures, all participate in the wealth drawn

from the impoverished grain, cotton, and tobaco fields of the United States. Hence not one of these great interests has ever manifested a wish to arrest the present practice of exhausting the natural fruitfulness of the soil. Commerce urges the cotton planter, the grain grower, and the producer of provisions to push every laborer and every acre of improved land to their utmost, and furnish agricultural staples to be exchanged for foreign goods. The owners of railroads, canals, steamboats on rivers, and shipping on the great lakes, as well as on the ocean, look mainly to the tillers of the earth for freight, travel, and profits; while all manufacturers desiderate cheap wool and cheap cotton, cheap wheat, corn, butter, meat, and lard, no matter what damage is done to the arable lands of the country. The great primary source of the food and clothing of all is regarded as unworthy of a moment's serious consideration. At what cost of the elements of fertility three million bales of cotton are annually made and sent off the plantations which produce them, is a question of fact about which no statesman inquires, and to which public attention has never been turned. In the absence of statistics calculated to throw light upon this subject, we are constrained to ask, in what way such an annual drain upon the cotton lands of the South can be supported in all coming time? What answer does art or science give to this question? The soil loses thousands of tons of its most precious constituents of crops every year, and receives no equivalent in manure, potash, soda, and magnesia, or in ammonia and phosphoric acid. Without adequate restitution the impoverishment of arated fields is inevitable. But how can full restitution to all the cotton, tobacco, corn, and wheat fields of the United States be made?

It is important to show that individual farmers and agricultural societies can never accomplish this truly national object. So long as the inhabitants of Boston, New York, Philadelphia, Baltimore, and other cities, choose to waste the elements of fertility taken from the soil in breadstuffs and provisions, and necessarily sent to cities for consumption, what can the owners of impoverished land do to prevent them? Clearly the wheat-grower of Michigan has no control over the flour sent from that State, whether it be consumed in New York, New England, or Old England. The farmer must export his grain and provisions, and the planter his cotton, tobacco, rice, and sugar, whether his fields suffer exhaustion or not. While American soil is thus parting with millions of tons annually of the atoms which alone secure fruitfulness to the earth, from what source, and by what agencies, is the equivalent of these exported atoms to be restored to the land that is barren, because it has lost them? It is not the cultivator that wastes the raw material of cotton, wool, grain, vegetables, fruits, and provisions. It is commerce, manufacturers, and the community at large, that place the elements of crops beyond the reach of the good husbandman. If the community, through its State and national legislatures, will do nothing to aid the farmer in giving back to the land its own elements of fruitfulness, restitution is impracticable. The same principle which secures to every one the quiet and peaceable possession of the acres to which he has a legal title, as a common right enjoyed alike by all, must be applied to the enduring fertility of these acres, in which every one that eats bread, or wears clothing, has an inalienable interest. The twenty-five millions of people now in the United States did not create, nor produce in any way, the

natural fertility of the land which they are so rapidly exhausting, as the most trustworthy statistics demonstrate. It is right and proper for each generation to use all the natural resources of the earth; but for any one generation to destroy or seriously injure them, is a wrong of the gravest character and of inestimable magnitude. In twenty-four years from this time there will be fifty millions of inhabitants in the present confederacy to be supported, no matter how much we may injure the soil by taking every thing out of it and putting nothing back. The damage done to the arable lands in the present decade, from 1850 to 1860, will be at least fifty per cent. greater than was ever before inflicted in the same length of time. This result will accrue, because every improvement in tillage, husbandry, farm implements, railroads, river, lake, and canal navigation, furnishes increased facilities for robbing the subsoil as well as the surface soil of its elements of crops. Art and genius alike assist the cultivator to draw constantly on the subsoil for the raw material of cotton, grain, grass, tobacco, and roots. The certain and most obvious effect of this practice will be the impoverishment of the subsoil in a few years. Deep ploughing, and large crops sent off the farm, mean nothing more than deep sterility in the end. Such farming will build up cities, construct hundreds of railroads and thousands of ships, and erect numberless mechanic shops and manufactories; but it will certainly consume the natural fertility of a continent in the operation. There is but one way now practicable in which to escape such a disaster. The means already in use for the benefit of agriculture, important and valuable as they are, can never overcome all the difficulties in the way of universal reform. The evil is too deep-seated, and the wrong imposed upon the soil and posterity too little appreciated by the masses, for them voluntarily to adopt, as by a miracle, the proper remedy.

As a principle, founded in nature and sound morality, restitution is the offspring of modern science. When plants and animals grow, and gain in weight and substance, not an atom of new matter is called into existence; and when they die and rot, not an atom is lost or annihilated. Some atoms are scarce, like those of potash, soda, chlorine, magnesia, ammonia, sulphuric and phosphoric acids, in ordinary soils; others are abundant, like those of water, sand, iron, and alumina. Every product of farm labor is either a vegetable or animal substance, and is always formed of the same kind of atoms. Thus no other atoms than those of oxygen and hydrogen can yield the water, so largely consumed by all living beings; nor can any other substance perform the functions of water in the vegetable and animal kingdoms. The same remarks apply to carbon, nitrogen, and other constituents of crops. The science of agriculture consists mainly in the systematic study of atoms, and of the natural laws by which they are governed, as minerals, and as organized bodies endowed with vitality. The deeply interesting but occult phenomena of tillage and husbandry cannot be successfully investigated by common farmers with their present advantages, and therefore they need institutions designed expressly to develop new truths in agriculture, for the equal benefit of mankind. The want of such institutions is the true reason why rural sciences are exotics in the United States, and appear incapable of taking root in American soil. In all North America there is not one agricultural school; and yet there are men so hopeful and credulous as to expect agricultural sciences to yield a rich harvest before the

first seed is planted! All concede that knowledge is power in agriculture as well as in other callings; but when it is proposed to adopt measures to augment our knowledge of rural affairs, by more extended and critical research, that all may advance from things known to things unknown, which alone constitutes progress in wisdom and power, we are met by constant and successful opposition. We repeat the same common-place remarks in our agricultural books and papers a thousand times every year, because no legislature lends the least assistance to those who would gladly experiment for the advancement of agriculture. Weigh this great interest in all its bearings on other interests, and study its intimate association with the primary sources of fertility in land, and the various causes of infertility, and then say what better remedy than the increase of knowledge among the owners and cultivators of the soil can be suggested. All that the friends of agricultural education ask is, that the remedy which they propose have a fair trial before it is condemned and rejected. Certainly the systematic study of all agricultural phenomena can do no harm, and may be worth indefinite millions to the country, by saving the natural resources of our farming lands from needless waste and exhaustion.

It may be asked, what assistance in behalf of agricultural education ought Congress to render? It should establish an industrial university near the federal metropolis, partaking of the character of a normal school, for the thorough education of professors of the applied sciences, who are now needed in State institutions as teachers. Agricultural and mechanical schools of a high order would multiply rapidly if there existed the right sort of professors to serve the public, by the skilful union of mental culture and physical labor. Science may not do so much for the industrial interests as many expect; but let the application of science to agriculture and the mechanic arts have as much of government favor as has been extended for the application of science to naval and military operations. We have no agricultural text-books for the use of schools and private students; and there is not an agricultural museum in the United States. About six hundred million dollars are invested in live stock, which is susceptible of easy and valuable improvement. But before the science of breeding horses, dairy cows, beef cattle, hogs, and sheep can be generally known, farmers must have good text-books on comparative anatomy, natural history, and agricultural physiology; and before such text-books can be written in this country, a museum, illustrative of the organic structure of all domesticated animals, facilities for anatomical dissections and microscopic investigations, and a good agricultural library, are indispensable. Without an educational institution of a high order, at which teachers and authors may be qualified to discharge, in a creditable manner, their respective duties, we can never begin aright to study either agriculture or the mechanic arts. The intelligent farmers and mechanics want an industrial university to educate educators, that all that is valuable in science may be united with all that is useful in the industrial pursuits of civilized man.

Justice can never be done to the soil until all classes study, understand, and obey the laws of nature, in accordance with which they are to be abundantly fed and clothed at the minimum price in all coming time. Those that dwell in cities must fully appreciate the necessity of concentrating and deodorizing all fecal matters, that they may be sent, like

guano, a thousand miles, to recuperate the land from which such matters were extracted. So soon as the light of science is let in upon the popular mind in cities, villages, and rural districts, all will see that the pestilence of towns is the offspring of ignorance. Remove the deplorable ignorance that now darkens the human understanding in reference to the true sources of three-fourths of the diseases which afflict society, and they will be prevented by wise and timely sanitary regulations. Every acre of the twelve million acres under cultivation in the State of New York really needs five dollars' worth of manure a year. Here is a demand for sixty million dollars' worth of commercial manure in a single State. Why, then, should the rotting of vegetable and animal substances in the numerous cities and villages of that commonwealth be permitted to breed pestilence in a thousand forms? Thirty-odd persons died in two or three days in Rochester in the summer of 1852, from cholera, generated from rotting cabbages and codfish in the cellars of a small block of provision stores. Sixty years ago, when New York was subject to the yellow fever, Dr. Samuel Mitchell wrote the letter from which the following is an extract: [It should be stated that Dr. Mitchell was secretary of the first agricultural society established in New York in 1791, and that he is treating of the importance of azote or "septon" (now called nitrogen) as a constituent of agricultural plants.] "American municipalities had rather offer a yearly sacrifice of hundreds of citizens to the demon of pestilence than make the most easy and obvious of all public provision for washing away such pollution. I have often thought the sixth labor of a great deity of antiquity very applicable to the considerable towns in the United States, which may be considered as so many Augean stables, requiring the waters of a river to be poured through in order to cleanse them."

Again, he says: "Neatness and elegance are thus found to be as conducive to good health as to good husbandry. On considering the matter it appears that the effluvia from the neighborhood of dirty cottages and mean huts, in the country, are of a like nature with the pestilential fumes which insinuate themselves into foul and unventilated tenements in cities; and the reason is apparent: wherefore, as penury is generally associated with ignorance and nastiness, and often with indolence, these distempers rage with such tremendous violence among the poor.

"When I see a farmer permit such unwholesome substances to collect around his habitation, I cannot help reflecting on the danger which awaits him. The manure, which ought to have been carried away and spread over his lots, serves, as it lies, but to make his family sickly, to disable his laborers, and lead him to the dubious and expensive routine of physic; and as in common life, as well as in logic, one blunder leads to another, the want of crops, and the consequent failure of income, drive him to mortgages, judgments, and executions—those fatal expedients of the law.

"In like manner do I lament the indiscretion of tenants contending in our cities which of them shall obtain, at a high rent from the distant landlord, *a pestilential stand for business!* With the view of bettering themselves they venture, at all hazards, amidst the poisonous exhalations of the neighborhood. By and by they are visited with distempers; and as they are honest and sober citizens, having no uneasy consciences to reproach them for their sins, they piously consider the infliction as a

monition from Heaven to try their virtue. Their sense of constancy and firmness forbids them to fly from the scourge of the Lord; and thus they religiously stick to the infected spot! What is the true interpretation of such conduct, but that both the farmer and the trader, *obstinately persisting in the means of self destruction*, are guilty of a sort of suicide?

"It is a fact long ago established, that great cities are the graves of the human species. It is a truth of almost equal importance, that the foul habitations of country people are nurseries of pestilential distempers."

In vain have medical men preached the above doctrines for three-fourths of a century. Habits stronger than a love of life prompt the citizens of this free land to persist in desolating the earth, and accumulate the elements of pollution, sickness, and premature death in all American cities. To remedy the evil, something more must be done than has ever yet been attempted. Municipal, State, and national legislation must initiate the needful reforms, or no reforms will ever be realized. Three years ago, when the writer took charge of the agricultural department of the Patent Office, he begged permission to expend two hundred dollars in experiments designed to ascertain the best way to deodorize and concentrate night soil, that it might be put up in bags and sent far into the country for agricultural purposes; but not a dollar could be had. To expend $100,000 in printing, binding, and distributing through the mails, a book on agriculture, and at the same time refuse two hundred dollars for the most valuable information within our reach, to put into the book, seems like being penny wise and pound foolish.

The Royal Agricultural Society of England has offered a premium of a thousand pounds for the discovery of a manure equal to guano in strength, that can be manufactured and sold in large quantities, at five pounds, or twenty-five dollars, a ton. This liberal bounty shows that the subject is yet in the dark in England, and that the science of manures is deemed worthy of critical research and study. If it be so there, how much more so in this country, where the fruits of agriculture are not consumed near the fields that produce them, but exported by millions of tons, in cotton, sugar, tobacco, corn, wheat, rice, and provisions? Irrespective of all crops, a year's tillage injures the soil in the United States, and especially in the planting States, at least twice as much as it does in Great Britain. When the plough, hoe, and cultivator stir the vegetable mould in cotton culture nine or ten months in twelve, the mould is largely consumed, just as the organic elements of a manure heap are rapidly wasted away by the frequent turning and stirring of the mass while exposed, as all tilled lands are, to alternate rains and sunshine. Twice the quantity of rain falls in the southern States in the course of a year that falls in England, and it falls in one-third the time. It is not so much the atoms removed in crops, as those washed out in solution, or suspended in water as fine mud, that impoverishes the arated fields of the planting States. Southern agriculture is not at all understood out of the States where it is practised, nor is it so closely studied in those States as it ought to be. Agricultural meteorology and engineering deserve far more attention, not only at the South, but in every part of the country, than they now receive.

The farms in the United States contain over 300,000,000 acres, on every square foot of which there falls an average of 200 pounds of water, or more, per annum. Wisely husbanded, this immense quantity of rain-

water may render the farmers and gardeners a vastly greater service than it now does. Skilful engineering has yet to be applied to American agriculture, with a view to make the most of steam power, water, fuel, earth, rocks, air, sunshine, and vegetable and animal vitality. Never was there opened up a field so inviting and boundless for the successful employment of capital, learning, labor, talent, and genius. We have a continent for the basis of agricultural operations, embracing climates, and physiological and material resources, equal to the wants of a thousand millions of prosperous and happy people.

With such unlimited wealth, it is painful to contemplate the fact, that we so misapply our physical and intellectual energies as needlessly to impoverish the land in every State and Territory of the republic. Tennessee contains 28,160,000 acres, of which, according to the census of 1850, only 5,175,173 are "improved land." These figures show that there is a wide range for stock in that State, outside of improvements as well as on them; and, consequently, that we may expect to find a large increase of neat cattle in the Commonwealth from 1840 to 1850. So far, however, is this from being true, that, like New York, Tennessee is forced by the exhaustion of her soil to keep fewer cattle in 1850 than she did in 1840. At the latter period the State returned 822,851 head. In 1850 the number was reduced to 750,765. Decrease in ten years, 72,086.

The people of Tennessee have been engaged fifty years in exporting the few available atoms which a beneficent Providence placed in the surface of their lands, in the shape of grain, tobacco, live stock, and provisions. Probably not one hundred tons of manure of any kind were ever imported into the State to balance the account with the soil. Hence its constant deterioration was inevitable.

Kentucky contains more acres of improved land than any other State except New York, and more than twice as many as Tennessee. It is a remarkably fine grazing and corn-growing State, having a great deal of naturally rich limestone land. Acres under improvement in 1850, 11,368,270. Number in the State, 24,115.200. Acres of unimproved land, 10,972,478. These figures are interesting, as showing that more than nine-tenths of the whole area of Kentucky are covered by farms. There are embraced in improved and unimproved land, 22,340,748 acres of the 24,115,200 in the State. Fertile as much of the soil of Kentucky naturally is, it is unable to endure without serious detriment the American system of tillage and husbandry. Instead of increasing their neat stock with the increase of acres subdued for pasturage and tillage, the number decreased from 1840 to 1850, 33,786. In 1840 it was 787,098, and in 1850, 753,312.

Horses and mules are largely reared in Kentucky for exportation to the cotton and sugar-growing States; and one might suppose that, instead of rearing neat cattle, mules and horses had taken their place. Such, however, is not the fact. In 1840 there were 395,853 horses and mules in the State; in 1850, 381,291. Decrease in ten years, 14,562.

While the owners of the land in Kentucky are enriching all who are engaged in trade, inland and foreign commerce, by unprecedented draughts on the soil, they forget that their own children and grandchildren must suffer an almost irreparable injury by their folly.

An intelligent wheat-grower in Wisconsin writes to the agricultura

department, that lands which have been cultivated only twelve years in that newly-settled State now yield but half the number of bushels per acre which was obtained at the beginning. Other farmers equally entitled to our confidence corroborate this important information. Extensive corn-growers in Indiana say that river bottoms that once produced from sixty to eighty bushels of corn per acre now yield only from thirty to forty. It is much to be regretted that the census of 1850 did not give the number of acres devoted to the production of each of the great staples, as a means of instructive comparison hereafter. If there were not room in the blank schedules without extending them too far, then the almost vacant column that contains the few pounds of hops grown in the great cotton-producing States, would have sufficed to set down the number of acres planted in cotton in every county, district, and parish at the South. It would have been infinitely better to remain ignorant of the pounds of beeswax made in the United States, if need be, than of the number of acres cultivated to produce 592,141,230 bushels of corn.

These suggestions are made not in a spirit of fault-finding, but solely with a view to encourage State legislatures to do more than they yet have for obtaining reliable agricultural statistics. The writer drew up the bill and schedules for taking the agricultural part of the census of New York in 1845, and he has labored many years to persuade both statesmen and the masses that something more ought to be done for agriculture than has yet been attempted in this country. The public interest demands that reliable statistics be obtained in reference to what the soils of the several States really possess of the indispensable elements of crops, which are available for agricultural purposes. If this were done, it would doubtless be found that some lands have a surplus and others a deficiency; and that by removing the surplus elements of fertility from exceedingly deep and rich soils to such as are comparatively thin and unproductive, the latter may be greatly and permanently improved without sensible injury to the former.

In the Report from this department in 1850, we endeavored to call public attention to the advantages of a critical study of soils, for it is believed that their positive resources have been sadly neglected and are not generally understood. Our agricultural statistics and practice are alike imperfect and deceptive, and nothing but appropriate legislation by Congress and State legislatures can save the farming lands of this continent from being made poorer than the poorest old field in any State at the present time. Ten million laborers will soon be at work under our equally progressive and destructive policy in the production of crops, whose elements will be wasted in cities and villages. Before the close of the present century, this country will doubtless contain one hundred million inhabitants; and as we educate the children who are to bear rule twenty five and perhaps fifty years hence, so they will act either to improve or desolate the farming lands of the republic.

If agricultural sciences are never taught in the United States and never properly studied, how is it possible for them to be understood? Without qualified teachers, without text books, without agricultural schools or agricultural statistics worthy of the name, and without popular sympathy, how is a change to be effected for the better? Thirty years ago we thought that agricultural education would soon be popu-

ar; now we believe that one or two generations must live and die before we shall fairly begin to investigate the true principles of farm economy. If four-fifths of the elements of fertility contained in the residue of the food consumed by the twenty-five millions of people in the United States were restored to the land, the gain to the latter beyond what it now receives would be equal to one hundred million dollars a year.

That the health of all cities, and sound farm economy, alike demand such restitution of all fecal matters, is denied by no one. But so long as indefinite millions of acres of rich virgin lands, over which no plough has ever passed, are accessible to all, few will incur the expense of making adequate restitution to the soil as a duty. Hence the science of tillage and husbandry will long be neglected on this continent, while the inventions and advancement of rural arts will continue, and enrich the present generation and one or two succeeding ones, by creating a barren territory for all that may come after them.

Population in cities will continue to increase twice as fast as it does in farming districts, simply because the treasures of the land will be transferred to commercial and manufacturing towns, there to be consumed and wasted. American statesmanship has adopted a system of political economy which renders full and perfect restitution to the soil impossible so long it shall prevail. This statesmanship, which ignores the very existence of agricultural science, and repudiates all its teachings, costs the country three hundred million dollars a year by the needless destruction of its agricultural resources. All power seeks to perpetuate itself, and therefore it is not to be expected that the systematic study of agriculture will be encouraged during the last half of the present century. If the best informed men in the country will do nothing to foster agricultural science, it is folly to pretend that men less informed will do any better in that behalf. So long as American statesmen shall lack both foresight and forethought in all that relates to the planting, farming, commercial, and manufacturing interests of the United States, the soil on which their interests rest for their enduring support will lose all, and gain nothing but desolation. If it were possible to persuade State legislatures to give a true statistical account every year of the number of acres under tillage, and in meadows and pasturage, and the products of each, additional evidence would be furnished corroborating every statement which we have made respecting the ceaseless drain upon one hundred million acres in this republic.

AMERICAN AGRICULTURAL LITERATURE.

BY DANIEL LEE, M. D.

There are more agricultural journals published in the United States than in all the world beside. This is a pregnant fact, and one that promises future achievements in rural literature which no other nation is likely to equal. In fifty years this republic will contain one hundred million inhabitants, all speaking and writing a common language, and enjoying all the advantages and blessings of popular education, in an unprecedented degree. Then, as now, three-fourths of the people will be happily engaged in agricultural and horticultural pursuits. What, then, is likely to be the most prominent, interesting, and commanding feature of American literature? What other department of human knowledge presents so many points of attraction to the popular mind in all the States as the knowledge that relates to tillage, husbandry, fruit culture, rural literature, and sciences? As an intellectual employment, the field to be cultivated is almost unlimited, while the harvest that may reasonably be expected far transcends, in dignity and importance, anything which the world has ever witnessed.

Hitherto, educated men have strangely overlooked the wealth that lies on the very surface of American soil, in its vegetable and animal products. Such, however, is the keenness and activity of American intellect, that every branch of agriculture and horticulture will, ultimately, have its text books, its special schools, its professors, its museums, its science, and its literature. This division of labor is indispensable to advance any department of the most comprehensive of all professions. Let a gifted mind concentrate all its powers on one object, and the chances are greatly increased that the end aimed at will be attained. The climates of the several States and Territories between the Atlantic and Pacific oceans are so various that they secure to agriculture and horticulture almost the widest possible diversity of employment and study. All tastes, and every grade of talent, may find fitting and congenial associations. In this circumstance, coupled with a common and earnest effort to improve, may be seen the elements of universal success.

Among the early cultivators of agricultural literature in this country, the name of Robert R. Livingston, of New York, long distinguished as chancellor of the State, deserves honorable mention. Mr. L. was over twenty years president of the first State society for the promotion of agriculture in New York, which was organized in 1791, and supported till after the death of the chancellor in 1813. In point of literary and scientific merit, the papers of no other society in the United States connected with agriculture excel, if they equal, those published by the one over which Mr. Livingston presided with so much dignity and usefulness. To Pennsylvania is due the honor of originating the first agricultural society after the Revolution established in this country. It was founded in 1785, and Judge Richard Peters was its president and most active promoter

and patron. In 1792, a similar association was formed in Massachusetts; and we believe, soon after, a society, having the same object in view, was called into existence in Connecticut. We have not the transactions or records of any of the societies founded in the last century, (nor the time to do them justice if we had,) except that of New York. On another occasion we shall endeavor to bring before the present generation of agricultural readers the merits of the home correspondents and agricultural compeers of the illustrious Washington. As agriculturists, the great men of the Revolution and the authors of our present incomparable constitution deserve far more consideration than they have hitherto received. Although not learned in the technicalities of modern sciences, nor thoroughly educated in literary attainments, yet no men of any age ever had a clearer perception of the wants and interests of an agricultural people, or labored more faithfully to elevate the calling and improve the condition of the tillers of the soil. Washington and his compatriots were too far in advance of the masses and public opinion to be duly appreciated as agricultural writers; and the public duty devolves on us, their posterity, to bring out their many excellences, that the world may know what they thought, and said, and did, in behalf of American agriculture. We know not how to promote the great farming interest better than to appeal to the united testimony of the founders of our republican institutions, and the fathers of our first agricultural societies. If the statesmen and sovereign people of this day will not regard the teachings of the wise men of the last century, and of the first quarter of the present, no arguments drawn from recent history are likely to be more successful.

Robert Robert Livingston was born in 1745. The family of Livingston is a very ancient and respectable one in Scotland, "distinguished for its numbers, opulence, talents, Christian virtue, and attachment to liberty." That branch of the family which came over to this country emigrated about 190 years ago. On their first arrival, there were but two heads of families, an uncle and a nephew, from whom have descended the numerous persons bearing the name of Livingston in the United States. In the first American Congress, which sat in Philadelphia, Robert R. Livingston was a member, and a distinguished advocate of an immediate declaration of independence. By his education, talents, wealth, and position in society, Mr. L. gave to the cause more than a common support, and was wisely selected as one of the immortal committee to draught the declaration which separated the Thirteen Colonies forever from the crown of Great Britain. Mr. Livingston was chairman of the committee that draughted the first constitution of the State of New York, to the excellences of which that prosperous Commonwealth owes much of its wonderful success and present unequalled wealth, population, and greatness.

George Clinton, the first governor of New York after the Revolution, was a working member of the agricultural society under consideration. The distinguished Dr. Samuel Mitchell was secretary, and contributed several valuable papers to its transactions. John Jay, Ogden Hoffman, Philip Van Cortlandt, Simeon De Witt, Samuel Jones, Ezra L'Hommedieu, Jeremiah Van Rensselaer, and many more of the most talented men of the 18th century, appear by their names as members, or in the act of incorporation. They had read Roman history, poets, and orators with care; and they admired the sentiment of Cicero, a name synony-

mous with eloquence itself, who declared that "of all pursuits, none is better, none more productive, none more delightful, none more worthy a freeman, than agriculture." Rome saw her best days when such practical farmers as Cincinnatus and Cato were honored with the confidence of the people, and the farmer of Clermont, on the Hudson, next to the farmer of Mount Vernon, on the Potomac, did most to foster a taste for rural literature and occupations in the young republic, for which they jeoparded so much, and labored so long, and so successfully. Chancellor Livingston administered the first oath to the first President of the United States; and at the conclusion of the solemn ceremony, he pronounced, "Long live George Washington," declaring as the oracle of Heaven, "that Washington should forever live in the hearts of his countrymen."

Mr. Livingston was the first to introduce the use of gypsum, or plaster of Paris, as it was then called, into the United States. He was a liberal importer of Merino sheep, improved Durham neat stock, and of many valuable seeds. When Mr. L. and his associates began their organized efforts in behalf of an improved system of tillage and husbandry, New York was the fourth State in the Union in population; and its cultivators were emigrating out of it because the old farms were "worn out." In the twenty years that intervened between 1790 and 1810, when this State society was in active operation, her truly great men, co-operating under a charter, made New York the most populous State in the Confederacy. Instead of losing by emigration out of the State, its farmers were made so prosperous by the diffusion of agricultural knowledge, that thousands and tens of thousands of immigrants from New England on the east, and Pennsylvania on the south, came and settled upon the soil of the Commonwealth, whose statesmen appreciated its value, and labored to improve its cultivators. The same enlightened policy led to the construction of the Erie canal—a work projected before the death of Chancellor Livingston, although not commenced till 1817. If the agricultural history of New York were fully and properly written, it would be one of the most instructive and useful books that could be placed in the hands of the American people. It was the farmer of Clermont who expended many thousands of dollars in France and on the Hudson, in experiments, before he and Fulton got a steamboat to operate successfully. This educated, scientific farmer was too deeply engaged in practical operations to write much for the instruction of posterity. In 1796, he applied to the legislature for exclusive privileges in the use of steam on the Hudson river in case he was successful in the construction of steamboats. The liberal education of farmers in this country has ever been attended with useful results; and the historical evidence of this fact may rightfully be considered as a part of our agricultural literature.

After the British had burnt the village of Kingston, the farmer of Clermont gave the distressed inhabitants five thousand acres of valuable but uncultivated land, to aid them in rebuilding their town. Generous feelings and noble sentiments should be cultivated as well as the soil. It is an exceedingly short-sighted policy that prevents the establishment of agricultural colleges and schools in the United States. Sixty years ago the secretary of the New York State Agricultural Society discovered the importance of azote or ammonia as one of the constituent elements of plants. Although the fact was published at the time, as a matter

worthy of the attention of all farmers, and the inhabitants of cities and villages, who are so often poisoned by the pestilential effluvia generated by the decomposition of manures and other vegetable and animal substances, yet the information attracted no notice until Liebig wrote a small book on the subject, about ten years since. One hundred thousand copies of Dr. Liebig's speculations on the growth of cultivated plants have been printed and sold in this country, while the more correct views of Dr. Mitchell, written and printed before Liebig was born, have received no consideration whatever. We all neglect, and too often repudiate, the rural science and literature of our own citizens as worthless, and receive as law and gospel in agriculture the hastily-formed opinions of foreigners. It appears to be easier to adopt the notions of other nations, whether right or wrong, than to think, study, and reach the truth by original investigations of our own.

On page 41 of the first volume of Transactions, Mr. Livingston makes the following statement:

"May 20, 1791.—I received a piece of flax, about half an acre, sown by a poor tenant, very injudiciously, on a dry, sandy declivity; it looked (as might be expected) extremely sickly, and, as it was evident that it had not sufficient stamina to sustain the heat of summer, he proposed ploughing it up. I took upon me to be its physician, and prescribed three bushels of gypsum, to be taken the next morning while the dew was on the ground. I sent him the dose, which was faithfully administered, and I had the satisfaction of seeing him gather more flax from this half acre, notwithstanding the uncommon drought of the summer, than any acre in this neighborhood afforded.

"N. B.—I borrowed this hint from Mr. William Cockburne, who had experienced the beneficial effects of gypsum on flax."

To "borrow" useful knowledge never impoverishes the lender; therefore it is that the wisest men are able to lend and borrow the most valuable information. Dr. Elliot, of Connecticut, in the last century experimented in feeding hogs on dry corn and corn soaked in water. The latter was found to be much the better way, in an economical point of view. This and many other useful suggestions are given to the public in his essay on husbandry. We can now add, from recent experiments, that boiled corn is better than soaked, or ground and not cooked.

Under the heading "The manure of leached ashes," Mr. L'Hommedieu says: "Ten loads of this manure on poor land [on Long Island] will produce ordinarily twenty-five bushels of wheat, which exceeds by five dollars the expense of the manure; the five dollars pays for the expense of labor in raising the crop. The land is then left in a state for yielding a crop of hay of between two and one and a half tons per acre, which it will continue to do for a great number of years. In short, no manure has been found as yet to continue so long in the ground as leached ashes."

One of the best articles on the tarring of seed-corn before planting and rolling it in plaster or ashes was from the pen of James G. Graham, esq., and read before the Society, February 28, 1798. He calls particular attention to the still common error of tarring dry corn, which has the effect to exclude moisture when planted, and of course prevent the germination of the seed. Seed-corn should be soaked before it is coated

with either cold or warm tar; and it should be immediately planted in fresh earth. To dry again, either before or after planting, affects injuriously the vitality of the germ. Tar protects the seed from the attacks of grubs and worms, birds, squirrels, and mice.

A well-filled volume of a thousand pages might be compiled from contributions to the agricultural literature of the United States in the 18th century, showing that the farmers of the Revolution, their fathers and grandfathers, were in no respect the inferiors of men of their class in any other nation. Under date of April 28, 1797, Noah Webster gives an interesting account of his success and experiments in growing potatoes. To form the most perfect tubers, he says that potato hills should not be less than four feet apart, especially where the soil is rich and the tops or vines spread much. L'Hommedieu's description of the Hessian fly, showing that two generations are produced in a year, has never been essentially improved, although written over sixty years ago. The most serious defect in our present rural literature is an excess of agricultural papers, and the too voluminous records of the proceedings of State and county agricultural societies. The popular taste is vitiated and cloyed by a superabundance of the chaff and parasitic fungi of science, while the pure grain and nourishing bread, needed by all, are forcibly driven out of the market. Quacks in agricultural science and literature, and speculators in farm implements, manures, neat stock, sheep, swine, seeds, and fruit trees, are reaping a rich harvest. Notwithstanding these drawbacks, agriculture is advancing faster than ever before, so far as the production of crops, domestic animals, fruits, and dairies is concerned. But we do not hesitate to express our belief that agricultural sciences are less cultivated now than they were thirty years ago. The popular mind is so taken by the showy flash exhibitions of mere pretenders, that scores of the best men in the country, whose attainments, properly directed, would qualify them to instruct the millions aright, have ceased to labor for the benefit of an unappreciating public. The friends of popular education, and of the best possible agricultural books, should discriminate between truth and error, selfishness and patriotism. Agriculture demands the services of men who are not only learned in the natural sciences, but skilled in the art of teaching them to uneducated laboring persons. In place of a sound and profitable agricultural education, young farmers are taught to grasp and attempt to comprehend the most recondite problems in geology, chemistry, vegetable and animal physiology, at the beginning of their professional studies. The intellect of the masses is overtasked at the outset of its labors, and it soon becomes discouraged, and ceases to make an effort to master sciences which appear perfectly incomprehensible.

Wise and valuable professors of the principles of tillage, farm economy, agricultural engineering and physiology, have yet to be educated in this republic. The truth of this remark cannot be seriously questioned, and the only debatable point is the length of time we ought to wait before the principles of agriculture shall be publicly recognised as worthy of systematic study in schools adapted to the teaching and learning of the same. Shall the owners and cultivators of American soil wait twenty-five, fifty, or one hundred years longer, before the first agricultural school or college is founded on this continent? This is really the only literary agricultural question before the public at this time; and until it

is decided either for or against a systematic effort to increase our professional knowledge, advancement in rural sciences, except by accident, is impracticable. Hence, in the fifty new volumes on agriculture yearly furnished by State and county agricultural societies, agricultural journals, Patent Office reports, horticultural reviews, and book publishers in cities and villages, one searches in vain for enough that is new to fill six hundred pages octavo. Important original researches are nowhere prosecuted, so that the discovery of new truths is neither expected nor made. Under such a state of things, how is it possible to enrich our rural literature by additions to our present stock of professional knowledge? We may all repeat what little we really know a million times each, and leave the sum total of knowledge just as we found it. Progress implies an advancement from things known to things unknown—an addition to the aggregate wisdom of the world. Of the true principles of tillage and husbandry the world is profoundly ignorant, and the evils resulting from this ignorance are increasing in this country faster than population increases. We suggest not merely the manufacture of fewer works on agriculture, but the expenditure of more time and money to develop new and useful facts, to be printed in these works for the instruction of their readers.

Among the most valuable published, the eleven annual volumes issued by the present New York State Agricultural Society deserve particular commendation. The first dates no farther back than 1841, and the last received is for the year 1851. Whatever is valuable in northern agriculture, as now practised, is plainly, truthfully, and copiously set forth in the transactions of this State institution, which is as wisely as it is liberally fostered by the legislature. The Society has availed itself of the scientific labors of Professor Johnston, of England, who delivered a course of lectures at Albany; of Professor Norton, of Yale College; of Professor Emmons, State geologist and agricultural chemist; of Dr. Salisbury, of Albany, chemist to the Society; and of hundreds of educated farmers in that large and populous Commonwealth. Our limits forbid the making of extracts from any of these eleven volumes, a majority of which approximate a thousand pages each. That for 1851 contains the elaborate and instructive report of B. P. Johnson, esq., the distinguished secretary of the Society, to the Governor, on the great London Exhibition, to which Mr. J. was sent as the commissioner to represent the State of New York. His report fills nearly two hundred pages of the eleventh volume.

The agricultural societies of Massachusetts have contributed largely and creditably to the rural literature of the United States. To do justice to these comparatively old and energetic associations, one needs to devote the labor of a year to read, compare, collate, and condense the valuable matter contained in many volumes. If all that is most worthy of study and preservation were printed in one book, it would deserve a place in the library of every farmer in the country; and we respectfully invite the attention of Boston publishers to the opportunity of getting out one or two volumes on the agricultural literature of Massachusetts, which would command an extensive sale out of that State and New England. The wants of reading farmers in most of the States are now quite indifferently supplied; and agricultural books of real merit would pay well for their publication.

The State societies of Ohio, Michigan, and Wisconsin are printing annual volumes of their transactions, which contain much valuable information. The spirit of improvement is fairly aroused in the West, and Indiana, Illinois, and Iowa will soon be in a condition to issue each an annual volume. The Southern Central Agricultural Society of Georgia has published one volume, and a continuance of the work is confidently expected. It has long appeared to the writer that an associated effort should be made by the three hundred agricultural societies in the United States to cultivate and improve the rural literature and science of every State and Territory, for the honor of the agricultural profession. An attempt has been made to realize this wish by the organization of a United States agricultural society, having for its basis all State and county institutions for the promotion of agriculture. How far this national society will fulfil the intentions of its founders depends entirely on its future management. An error has been committed in putting the price of its quarterly journal at two dollars per annum. Several attempts have been made by men of capital, talent, and business capacity to establish agricultural periodicals at prices above a dollar a year, but they have all signally failed. The journal of the United States society may be supported by donations from patriotic motives, or by aid from Congress. This, however, is to destroy its independence of character and influence. It should rely not on a few rich men or government for support, but on several hundred thousand working farmers, members of the society. At two dollars per annum, not two thousand *bona fide* subscribers can ever be obtained and kept two years in succession. A journal of so limited a circulation will be nearly powerless for any purpose of public utility. In a nation that has some millions of farmers, a work has little claim to popular favor or nationality which costs twice as much as a majority feel able to pay, or one in a hundred is willing to pay, for it. Reading farmers have many local journals, State and county societies to support; and, therefore, the number that will permanently give two dollars a year for a national work is comparatively small. By attempting too much, we often fail to accomplish the good which is clearly within our means and reach.

II.

AMERICAN POMOLOGY.

At the second session of the American Pomological Society, held in the city of Philadelphia in September, 1852, several valuable papers were read, being reports of committees from different States; so much of which as our limits will permit are copied, that the useful information therein contained may have a much wider circulation.

The communication of Mr. H. F. French, of Exeter, New Hampshire, on the same subject, written for this Report to Congress, is given as an introduction, and indicates many of the advantages to accrue from the extension of fruit culture in the United States.

NOTES UPON FRUIT GROWING IN NEW HAMPSHIRE.

He would have been a bold man who, even ten years ago, had prophesied that *fruit* would one day become a principal source of wealth to any part of New Hampshire, as bold as he who, but a few months since, ventured to announce that *caloric* would ere long supersede *steam* as a motive power. Both these strange events, however, seem already near their consummation.

In the present year, 1852–'53, it is a fact beyond controversy, that many towns in the county of Rockingham have received more money in exchange for their surplus product of *apples* than for any other article raised upon their farms.

The fact that this is the most profitable crop which can be cultivated among us, is well understood, and the only apprehension is, that the supply may exceed the demand. It is a fair estimate in this part of the State, that ten barrels of winter *apples* will generally sell for as much money as a ton of the best *hay*. *Hay* has been considered, for many years, the most profitable crop that can be raised for sale in this section of the State, and it has borne a price, for the ten past years, not upon the average above ten dollars per ton.

Mr. Robert F. Williams gathered from an orchard of *one acre only*, the present year, from grafts set in the year 1849, in very old and decayed trees, *two hundred barrels* of first-rate Baldwin apples. This statement is more valuable as showing how readily old trees may be changed from producing worthless fruit to the production of that which is of the best quality, than as giving evidence of a remarkable product.

To show how long a time is required to bring trees from the nursery into bearing, I will give another statement, which is about a fair example of the success of good cultivation among us.

John A. Lowe, esq., of Exeter, set sixty trees about three years from the bud in his orchard in the spring of 1843, and forty more in the fall

of the same year. They bore a few apples in 1847 and 1848. In 1850, he gathered six barrels; in 1851, twenty-one barrels; and in 1852, fifty barrels of fruit of the best quality.

A writer in the New England Farmer states that he knows "an orchard of *forty* Baldwin apple trees that yielded more than three hundred barrels of fruit of the best quality the past season, and about the same quantity in the season of 1850."

He says, further, "the ground about these trees has been kept in a perfectly pulverized state for half a dozen years or more, and manured like a garden." It should be borne in mind, however, that the Baldwin usually produces only every other year.

It would be a fair estimate that fifty trees, which would stand upon an acre at the distance of about thirty feet apart, would produce an average annual crop of sixty barrels of apples, worth at least sixty dollars. It is not uncommon to see a single tree bear ten barrels of fine apples, and instances have occurred where *sixteen* barrels have been gathered at once from a single tree. At the lowest rate of product that any man in his senses, who has ever properly cultivated an orchard in this county, would estimate as a common crop, an apple orchard will give *four times* as much profit as the same quantity of land in grass for hay, with less cost of cultivation.

With these remarks, as to the profit of the apple crop, I will proceed to other considerations. By way of apology to those who have given attention to this subject, and who will find nothing new in my suggestions, it may be proper to state that, abundant as fruit is in some parts of our State, in other parts no attention has been given to its cultivation. Indeed, apples are carried every year from Boston market fifty and even a hundred miles into New Hampshire, and sold at double the price of their first sale by the producer, because the demand can be met at no cheaper rate. In the greater part of the State, indeed, I suppose there is nothing like a supply adequate to the home consumption.

In the Patent Office Report for 1849, in an article on this subject, I gave some directions for *planting and cultivating* orchards. I shall pass over that topic at this time, with the remark, that the same manuring and working of the land which is bestowed usually in this State upon the cultivation of the corn crop is sufficient for an apple orchard. Indeed, my own practice has been to plant my orchards with corn and potatoes as if no trees were there, until the apple trees shade the land so that nothing else will grow, and then to plough and harrow the land once a year, applying about ten loads of compost to the acre, and letting the land lie fallow. No orchard kept in grass will flourish; and it is said, on good authority, that small grain, especially *rye*, has an extremely injurious effect upon fruit trees when raised among them.

VARIETIES OF APPLES FOR THIS LOCALITY.

For reasons which are not easily understood, the apple seems extremely sensitive to changes of climate. A variety which thrives well in New England, often fails in New York; while the favorite apple of

New York, the Newtown Pippin, cannot be raised in our part of New Hampshire.

A different list is therefore necessary for each locality, to be determined upon by careful observation of the actual success or failure of each variety.

In planting an orchard, regard should first be had to *home consumption*, so that the best variety of each *season* may be produced, and not a profusion followed by a famine.

I have, with some care, prepared a list of apples which have been proved in this county to be good bearers and of good quality, and which will probably, with such additions as every man will make, of two or three varieties from the *old homestead*, which taste better to himself than to any body else, be found a sufficient variety for all useful purposes. Except to the mere amateur, a great variety is a source of great trouble and little profit. Such an assortment as will supply the dessert and the kitchen through the whole year with the best varieties, both sweet and sour, and which comprises the best that can be profitably grown in this portion of the country, I have endeavored to include in my list.

For the *market*, unless for a mere market man, who sells daily, the less *kinds* of apples one raises, the more profitable. A single bushel of the best fruit will scarcely pay the trouble of selling, especially if it be not of a well-known variety; while a hundred bushels of Baldwins or Boxbury Russets will entice a fruit-dealer from Boston the whole length of our State, for the privilege of buying them in the cellar of the producer.

I have placed against each name the season at which the fruit may be considered fit for use in this locality. The same fruit is earlier as raised further south.

1. Sweet Bough.....August.
2. Williams.....August.
3. Porter.....September and October.
4. Gravenstein.....October.
5. Minister.....October to January.
6. Calef Sweet.....October to January.
7. Hubbardston Nonsuch.....November to January.
8. Rhode Island Greening.....November to February.
9. Baldwin.....November to March.
10. Boxbury Russet.....December to July.
11. Green Sweet.....December to July.
12. Red Russet.....December to July.

For orchard culture for the *market*, the last seven upon the above list, having been long tested in this part of the State, are recommended with confidence.

The Calef Sweeting originated at Kingston, New Hampshire, on the farm of a clergyman whose name it bears. It is well known in this region, and has found a ready market wherever offered. It is of about the size and form of the Baldwin, of a whitish-yellow color, a great bearer, and the very best *baking* apple known to me. Were not the character of this fruit established by the opinion of some of the best judges of fruit in the country, I should not dare to place it, all unknown to fame as it is, upon my list.

The *Hubbardston* is perhaps the most beautiful apple that grows, and in this instance "outward beauty is an index of inward good." Being

an *early* winter apple, it comes into the market in competition with the fruit from New Nork and New Jersey, and can therefore never bear the highest price.

Of the *Rhode Island Greening*, the same remark may be made; as its name indicates, its *home* is a little south of us. It is one of the principal market apples of Rhode Island, New Jersey, and New York.

The *Baldwin* stands decidedly at the head of market apples, thus far, in New Hampshire and Massachusetts; indeed, I think *one-half*, at least, of all the fruit sold from Rockingham county is of this variety. It is a fine grower, an enormous bearer, principally in the *even* year, and it is in eating from November to March, and even to May. In the northern part of this State, and in Maine, it is said that the young trees are liable to be winter-killed. The Baldwin is a native of Massachusetts, and seems impatient of removal far from its home. At the West it is affected with bitter rot. Further south it becomes an autumn apple.

The *Roxbury Russet* is an old, well-known variety. It requires good soil and high cultivation. Properly secured, it keeps until July, as it has as yet no competitor, at the end of the season, in Boston market. The *Red Russet*, it is thought, may eventually supersede it.

The *Green Sweet* is not named by Downing or Cole. Thomas speaks of it in favorable terms, and it has been long cultivated here. I find it recently coming into favor among judicious cultivators, who are producing it largely for the market. It is a great bearer, hardy, and keeps till June. For baking, in the spring months, it is very valuable. For feeding stock, I think it will prove the best variety known.

The *Red Russet* originated in Hampton Falls, and appears to be allied both to the Baldwin and Roxbury Russet, partaking of the good qualities of each. It grows well and bears as bountifully as the Baldwin, and keeps two or three months later. It has been raised long enough to be thoroughly tested in the neighborhood of its birthplace, and is thought by many of the "knowing ones" to be the most profitable of all for cultivation for the market.

Of the *Northern Spy*, which I have omitted in my list, because it has not been sufficiently tested in this region, I may say that it seems to me to be a larger, handsomer, better flavored, and later-keeping variety than the Baldwin. Large numbers of young trees of that sort are growing about us, and seem thrifty and hardy, and fine specimens of the fruit have been produced upon them. Whether it will prove a good bearer, remains yet to be decided. If it should produce fair fruit abundantly, it would take the lead in our orchards at once. I regard this as the only New York variety which can compete with northern fruit in our own market.

Apples for Stock.—No accurate experiments have been tried by which the value of apples for cattle and swine has been ascertained. This, like so many other important agricultural questions, has been left to be guessed out by Yankee shrewdness.

Most observing men believe now that apples of all kinds are valuable for milch cows and swine. The general impression is that *sweet* apples are, for such purposes, more valuable than *sour*, although an analysis, I believe, shows little difference in their constituent elements. The opinion has been confidently expressed by intelligent farmers, that sweet apples are of more value for stock than the same quantity of potatoes

My own opinion is that they are worth raising for this purpose, but that many years will elapse before good grafted winter fruit will be so cheap as to be thus disposed of.

The *Green Sweet* is, of all others, the apple to be cultivated for stock. Such food is not required till winter, and this variety will last till the 20th of May, which is *pasturing time*, in this State.

Supply and demand.—Great fears are expressed by many well meaning people, that no market can be found for the apples which will be produced upon the great numbers of trees recently planted in New England. The plentiful crop of the present year has seriously alarmed some, who seem not to consider how small a portion of the world they themselves inhabit. In fact, however, the *home* market is not yet half supplied. Every family should, and will in future years, consume at least twice as many barrels of grafted apples as of *flour*, and they who fear an over-supply may as well commence their lamentations over the immense crops of *wheat* of our western States. New Hampshire does not yet produce half so many apples as would supply the inhabitants of the State as abundantly as the people of this *county* consider necessary to their comfortable subsistence.

As to the *foreign* market, it should be borne in mind that the production of fine fruit of this sort is limited to a small portion of the earth, and probably no portion of it is better adapted to the culture of the best *late-keeping* varieties than New Hampshire.

No *late-keeping* apples can be produced in warm latitudes. The apples of England are inferior to ours in size and flavor and keeping qualities. Those of New York and New Jersey, which fill the markets early in the season, with the exception of the Northern Spy, are mostly gone by February, when the Baldwin of New Hampshire is in its best condition, and entirely disappear while our late varieties are perfectly sound. Most of the South and California are buyers, and not producers. By steam navigation, we may carry our fruit, in a few days, to the ends of the earth, and the fact that *ice* and the best apples are produced in convenient proximity for shipping together, and agree remarkably well in a voyage at sea, gives additional advantages to New England enterprise in this direction.

Ships freighted with ice and apples have already left our ports for Egypt and for China, as well as for many nearer markets.

The *late-keeping quality* of our apples is the circumstance which must always give the North an advantage over "the rest of mankind," and this has been an important consideration in preparing the foregoing list.

The prices at which apples shipped from this country have been sold in England would afford an enormous profit to the producers here. Seven, eight, and even twelve dollars per barrel, have been common rates of sales at auction.

So recent has been the production of any surplus crop, and so recent, too, the use of *steam* conveyance, either by railroad or navigation, that markets have not been sought, and no regular foreign trade in this fruit has been established. The surplus of our crop has been bought up by speculators, at their own prices, and the producers have not received a fair share of the profits.

Soon, a regular trade will be opened, and many years must elapse before any product of our soil can yield so liberal a return for labor and

capital as our crop of apples. Even at the low price of one dollar per barrel, which is the lowest yet reached among us, the culture of this fruit pays twice at least the profit of any other of our crops.

Pears.—So far as has been observed, the soil and climate of New Hampshire seem as well adapted to the growth of the pear as the apple.

Dwarf trees, worked upon quince, have been planted in large numbers about us, and as fine specimens of fruit from them have been exhibited at our State fair as have ever been produced anywhere. The dwarfs are preferred to standards for garden culture, because they occupy but little space. Besides, they come into bearing much sooner than the standards, usually in two or three years from transplanting, and some have borne perfect fruit *the same year* they were imported from France!

Pears upon the quince require high cultivation, because the quince root must always remain small and cannot wander far for nourishment. The farmers of New Hampshire are by no means accustomed to the thorough cultivation which dwarf pears require, and I have no doubt that an orchard of them, managed as even the best of our apple orchards are, would be worthless. Indeed, pears of all kinds, standards as well as dwarfs, require a deeper and richer soil, and more careful cultivation, than the apple.

For the convenience of those who are not "*posted up*" in this matter, I will give a list of twelve varieties, which will be found as good as any others which have been tested for our State.

Pears on Quince Stocks.

Names.	Time of ripening.
1. Louise Bonne de Jersey	September and October.
2. Urbaniste	October to November.
3. Duchesse d'Angoulême	November.
4. Vicar of Winkfield	Nov'r and December.
5. Beurré Diel	Nov'r and December.
6. Glout Morceau	December and January.

Pears on Pear Roots.

Names.	Time of ripening.
1. Rosteizer	August and September.
2. Bartlett	September.
3. Flemish Beauty	September and October.
4. Seckel	October and November.
5. Dix	November.
6. Beurré d'Aremberg	December and January.

I regret that the old St. Michael (White Doyenné) cannot be recommended. It is the very best of all pears, but for many years has failed in the eastern part of our State. The Flemish Beauty succeeds both on the quince and as a standard in this State as well as in Maine. Pears of this variety were produced in Exeter last autumn which weighed fourteen ounces each, and were of fine flavor.

Plums.—Plums are succeeding as well in New Hampshire as in any

part of New England. The *curculio*, its greatest enemy, has not for the past two years monopolized, as usual, this delicious fruit, and in many sections of the State plums have been abundant. It is said that as far north as Lancaster the curculio is not known; but I fear he is *there*, notwithstanding. I give below the names of six varieties, which will be found of good quality, and adapted to our State:

1. Washington.
2. Jefferson.
3. Prince's Imperial Gage.
4. Royal Hâtive.
5. Lombard.
6. Green Gage.

The *McLaughlin*, a new variety, from Maine, is there recommended as superior to any other, but it has not yet fruited here.

Peaches.—Peaches have been cultivated to considerable extent near the coast, and some flourishing trees are seen far in the interior. They suffer from the effects of winter, especially upon low and sandy land.

Cherries may be raised in abundance in the eastern part of our State. Care, however, should be taken to procure trees raised in the State, as those brought from New York have, for several years past, generally failed. Strawberries, raspberries, and currants are also raised here in perfection. We have native grapes of tolerable flavor, but we are too far north for the cultivation of the Isabella and Catawba, except in sheltered positions

Upon the whole, the tendency of our recent agricultural exhibitions is to show that New Hampshire has a fair proportion of the most valuable fruits of the earth, and to satisfy us that, however good a State it may be "to emigrate from," it is a *home*, too, to which we may gladly return from our wanderings.

Winter-killing of Fruit Trees and Fruit Buds.—Throughout New England, if not everywhere, we hear much complaint every spring that fruit trees are *winter-killed.* Again, we find that in some localities the peach trees have all their fruit buds destroyed, while the wood is not affected, but grows vigorously. The peach is more liable to injury of this kind in New Hampshire than any other fruit; occasionally the apple suffers injury, not only of its fruit buds, but of the wood also, and sometimes the tree is entirely destroyed. Of one hundred and sixty young apple trees which had been set in my orchard, from one to six years, about thirty were severely injured by the winter of 1851–'52, and many more somewhat affected. The first symptoms were observed early in April, when, in cutting off small branches near the trunk of the trees, I noticed a circle of yellowish wood immediately under the bark. The ends of the limbs and the outside of the bark, and even the buds, at that time appeared perfectly healthy. As the season advanced upon most of the trees, the buds opened, but some of them did not start at all. The bark on a few of them blistered and came off about the trunk. Such trees died to the ground; others put forth leaves on part of the branches, and some at the ends of the limbs, with the rest of the tree bare. The foliage upon many through the summer was very meagre, except upon the newly-formed twigs, where it was luxuriant.

Three trees, which had been growing about four years, and which I had regrafted in the previous spring, died utterly, except the root, although the scions had grown finely and remained plump and full of sap until the bodies had turned black under the bark. I cut off several at the ground and grafted them, and the new scions grew vigorously, indicating that the roots were still sound.

In the autumn, one of those which had put forth a scanty foliage, though making a fair growth, was accidentally broken off. Upon examination, I found that all the wood was discolored, except a ring of the alburnum, next the bark, which appeared healthy. Upon cutting into others, I observed a similar appearance, as if nature had made an effort to cover with a living stratum of wood that organization which had been so disturbed as to obstruct its proper offices. Having occasion in May, 1852, to travel over the westerly part of the State, I carefully observed the condition of the fruit trees wherever I went. The results of my observations were uniform. More injury had happened to the apple trees that winter than for many previous years. To low and sandy land, *subject to early autumn frosts*, and to *highly cultivated trees*, the injury was almost exclusively limited. My own trees stand upon a sandy plain, and were growing very rapidly, and I found scarcely an instance of an apple tree upon hilly land affected in the least.

The same remark may be made of the *peach buds*. My own, near my apple trees, and on similar soil, had set full of blossom buds, but not a single peach was produced, although the trees were not much injured.

Mr. Downing's theory has been, that whenever the thermometer sunk 12° below zero, the fruit buds of the peach were always destroyed by the mere intensity of the cold. But this theory was not correct as applied to New Hampshire. The thermometer in all parts of this State fell to 18° below zero last winter, and yet peaches were abundant. I myself saw trees loaded with peaches, at Derry, within twenty feet of the spot where the thermometer had indicated 18° below zero the previous winter. Mr. Downing himself, in one of the last numbers of the invaluable publication which he prepared, admitted that his theory was not supported by his more recent observations. *What then produces the injury?* It cannot be the mere *intensity* of the cold under ordinary circumstances, because, if it were, all trees of the same kind would perish at a given extreme of cold. The tree on the plain would not be taken, and the tree on the hill be left. The same tree would not pass unscathed through extreme cold of one winter, and perish the next at a higher temperature. We must look for the solution of our problem in some peculiar accidental condition of the tree.

In New Hampshire no winter ever passes without weather which sinks the thermometer below zero. Water freezes at 32°, and the sap, in the small twigs, must be frozen long before the weather is at zero. We all know that water, as it becomes solid, *expands* by crystallization, and we can readily comprehend that such expansion may rupture the sap vessels of the wood or bud, and so destroy its organization. If this be the cause of the destruction of the buds, and the injury to the wood, then it *should* happen whenever the sap freezes. Now, I will not undertake to affirm that the sap in the peach *does* freeze before the cold reaches 12° below zero. It is *possible* that there is in the sap of trees, and in the incomprehensible

phenomenon of its circulation, a power of resistance to cold sufficient for its protection to that degree. I speak cautiously on the subject, because there is no theory of the circulation of sap, which seems perfectly consistent with known facts, and I set this subject down among the matters not yet perfectly revealed. The circulation of the blood in animals generates heat in some way, and possibly the circulation of the sap in plants may do the same.

Count Rumford, in his essays, seems to assume that the sap of trees does not freeze, and reasons as if it were incontrovertible that if the sap freezes the tree must die. The first demonstrates that heat is propagated in fluids only by *circulation*, never by contact of the particles of the fluid one with another; or, in other words, that these particles are non-conductors of heat. Heated water rises, if heat be applied to the bottom of the vessel, because it is lighter, and the surface water must, of course, descend to make way for it. Water cannot be heated by the application of heat to the *surface*, but will remain at the boiling point for hours, resting upon cold water, or even ice, in a glass vessel, if the ice be confined so as not to rise.

Again, the *circulation* of water is impeded by mingling with it any fibrous matter, like eider-down, or by a solution of resinous substances, and so parts with its heat less readily. And, further, *wood* is almost a perfect non-conductor of heat. Considering all these facts, it must be manifest that the sap of trees, thickened as it doubtless is in winter by the evaporation of its watery particles in autumn, shut up in capillary vessels of *wood*, so curiously fashioned that it has been ascertained, in the process of *kyanizing*, that fluids cannot well be forced through them downwards. I say it must be manifest that heat escapes very slowly from a living tree; or, in other words, that the cold enters and freezes the sap only at a very low temperature.

Still the fact has been observed by every man who has chopped in the woods of New Hampshire in winter, that the logs *appear* to be frozen solid, and will fly open like blocks of ice at the blow of the axe, and show the frozen sap sparkling like diamonds.

After the sap has actually become solid by cold, as it would seem must be the case every winter, what *further change can be produced in it by greater intensity of cold?* What mechanical or chemical process, which thus destroys the trees or buds, is induced by twenty or thirty degrees of cold added to that which has already rendered the sap solid? I dwell upon this point, because the winter of 1851–'52 was one of the severest on record, and the injury to trees—apple trees in particular—was unusually great. Yet I am not willing to concede that the extreme cold of the winter caused this injury. The nurserymen of this region have assured me that tender, half-hardy shrubs, with the ordinary protection, endured that winter unusually well.

My conclusion upon the whole matter is, that it is not the *intense cold* of the winter which injures the peach and the apple in the manner referred to, but the early sudden frosts of autumn, which find the trees on warm and sheltered land, full of sap, unprepared for the sudden change. The vessels filled with the watery fluid are burst by the crystallization of freezing long before the extreme of winter. It is not improbable that the same effect may be sometimes produced in the winter or spring by sudden changes of temperature on wood not fully ripened.

This is a matter not merely of curious investigation, but of practical importance. If intense cold weather, to a certain degree, necessarily kills all our trees, we have nothing to do but submit as gracefully as we may. If, however, our trees are killed because they are *growing too rapidly* from over-cultivation, or because they are too much *sheltered*, or upon land *too sandy*, or land *undrained*, or in the *valley* rather than on the hill, we have the remedy, by the exercise of good judgment, in our own hands.

A careful and constant application of scientific principles to known facts will eventually bring out of the chaos of what we call *accidents* new evidence of the constant, uniform operations of the laws of nature.

HENRY F. FRENCH.

EXETER, N. H., *January* 29, 1853.

REPORTS OF STATE FRUIT COMMITTEES.

REPORT FROM MAINE.

Although a portion of the State of Maine has been permanently settled since 1630, and apples, pears, and other fruits were early planted in some sections, yet the systematic cultivation of such fruits, and of improved varieties, has, comparatively speaking, but recently begun to attract attention among our people generally.

It is true, that in some towns you will find the good effects produced by the zeal and taste of some enterprising person or persons, who planted orchards, and took pains to introduce the select and choice fruits of their time many years ago. But these were the exceptions, and their exertions were isolated, in a certain degree, and confined mainly to their immediate neighborhood. Among the fruit pioneers were the late Hon. Dr. Vaughan, of Hallowell, and the Hon. Ephraim Goodale, of Orrington, still living at an advanced age.

The territory of Maine is large, extending about three hundred miles from east to west, or through more than four degrees of longitude, and from south to north through nearly five degrees of latitude. This extent of surface would, of itself, cause quite a diversity of climate. The peculiar location, and the face of the country also, add to this diversity. In the first place we have more than three thousand miles of seacoast, with all its indentations of creek, bay, cape, promontory, and islands. In the next place we have, extending far into the interior, plains and mountains, lakes and rivers, with all the accompanying changes of soil, from primitive upward, and from rich alluvion to barren heath. From these causes there must, inevitably, be quite a difference of climate in different localities, sufficient to vary essentially the times of ripening of many kinds of fruit. We can introduce you to a portion of the State where most of the choice varieties of the apple grow and mature in perfection; and, without travelling beyond our boundaries, also introduce you to the very northern limit of the apple region, or at least where it is difficult to mature more than a very few varieties of that fruit. In one section, extending from the western boundary to the central portions and along most of the seaboard, the well-known *Roxbury*

Russet grows and matures in abundance and perfection, while in the northeastern section the autumnal season is not long enough nor warm enough to allow it to mature; yet some of the earlier varieties of northern origin—such as the *Red Astrachan*, *Duchesse d'Oldenburgh*, and also the *Fameuse and Ribstone Pippin*—exhibit a condition of growth and flavor deemed by many to be superior to any raised in other parts of New England.

It will therefore be borne in mind, that the notes on fruits herewith submitted as flourishing and ripening in Maine, have reference to the first-named portions of the State, and not to the northeasterly part, on the valley of the St. John's. The latter is as yet but sparsely settled, though it has a fertile soil, and is still a region where the hardy pioneer is making way for future improvements in the culture of field and garden products. During the first twenty-five years of the present century, almost every farmer planted an orchard, and some of them very large ones. The trees were mostly seedlings, and the principal object in view was the manufacture of cider, which then commanded a ready market and high price.

In process of time, the supply of this article far exceeded the demand, and, consequently, attention is now turned to engrafting these trees into varieties of established reputation in the market as table fruits. Those who now plant orchards are careful to select the best varieties. From the immense number of seedling trees which compose the older orchards among us, some very excellent varieties have been found, and are worthy of propagation; and, though they may not yet be widely known or fully proved in other localities, are nevertheless highly valued in the vicinity of their origin.

The present season has been a fruitful one, and marked by some peculiarities. Very little rain fell from the middle of May until the latter part of August—in some parts of the State the drought was severe and crops suffered. The value of *mulching* has been seen in an eminent degree in the case of newly-planted trees, which have made a fine growth; while of those not so treated many failed and others barely survived. The heat and drought combined have caused some fruits to ripen prematurely, and we notice considerable variation from the usual period of ripening in pears, especially *Doyenné d'Eté* and *Madeline*, which ripened as usual the first half of August. We have now, (September 1,) *Dearborn's Seedling*, *Rostiezer Bartlett*, *Beurré d'Amalis*, *Belle Lucrative*, *Flemish Beauty*, *Marie Louise*, and others, which usually furnish a supply during two months, all ripening together. The later sorts—as Aremburg, Vicar of Winkfield, Napoleon, &c., which, just before the late heavy rains, parted readily from the tree and seemed on the point of ripening—are now firmly attached and rapidly swelling, and bid fair to mature at the usual period.

The crop of apples is large. Of fine pears more will be grown than in any previous year; and so of choice plums in the central and eastern parts of the State, particularly in the vicinity of Bangor, where the curculio seems to have suspended operations for this season at least. In the western part of the State the blossom-buds, which were never more abundant, shrivelled and fell in spring, from some cause, without opening. [Query. What was the cause?]

APPLES.

Bell's Early—similar to, if not identical with, Sopsavine, or Sops of Wine—best; productive and highly esteemed.

Early Sweet Bough—best.

Red Astrachan—good; productive and profitable.

Duchess of Oldenburgh—good; productive and profitable.

Williams's Favorite—very good; needs high culture.

Porter—best; productive and fine.

Vermont—very like the Porter in form and color; flesh more tender, of milder flavor, and a week or ten days earlier—probably same as the apple more recently known as Walworth, and also by other names; has been cultivated here upwards of forty years, and considered highly valuable.

Gravenstein—best; productive, excellent.

Golden or Orange Sweet—best; productive; tree of moderate growth.

Fameuse—very good; hardy, and bears well.

Nodhead or Jewett's Fine Red—best; delicate flavor, skin thin, and liable to the curculio, its only fault.

Winthrop Greening—very good, if not best; originated in Winthrop; large, tender, crisp, and sprightly flavor.

Hubbardston Nonsuch—best; of rapidly increasing popularity.

Minister—very good; productive.

Baldwin—best, productive and fine; young trees very liable to be winter-killed.

Rhode Island Greening—very good, and reliable; best cooking apple.

Roxbury Russet—very good; profitable for its long keeping.

Ribstone Pippin—best; fully sustains its English reputation.

Vandevere—best; beautiful and fine.

Golden Ball—very good; tree hardy and a good grower, but not an early or great bearer; often supposed to be a native of Maine, but is not. Some fifty years ago the scions were brought from Connecticut without name, and for thirty years or more known only as the "Connecticut apple."

Danvers Winter Sweet—very good, long keeping.

Talman's Sweet—good, profitable.

Blue Pearmain—very good, fair and fine.

Mother—best; moderate grower and bearer.

Northern Spy—rapid grower, and very hardy; has fruited but two years; specimens not uniform, the well-grown ones only being very fine; is likely to be well proved, as large numbers of young trees have been planted.

PEARS.

The cultivation of this fine fruit is rapidly extending in this State, a great impetus having been imparted by the introduction of the quince stock, it being found by the use of the *Angers variety*, and the careful selection of sorts adapted to it, that many varieties can be grown in the highest perfection, which either entirely failed on the pear root, or would not repay the trouble and cost of cultivation.

Doyenné d'Eté—best early pear; tree of feeble growth, and overbears.

Dearborn's Seedling—very good, productive.

Bartlett—best; but on pear root trees very tender; hardier on quince.

Beurré d'Amalis—good, often very good; perfectly hardy, and a prodigious grower and bearer on quince.

Louise Bonne de Jersey—best; hardy and productive; on quince only.

Belle Lucrative or *Fondante d'Automne*—best; productive and delicious; pear or quince.

Marie Louise—usually very good; somewhat variable; pear root only

Beurré Bosc—best; so far as proved; pear only.

Flemish Beauty—best; combines more good qualities than any other pear; grown so far mostly on pear stock.

Rostiezer—best; small, but fine.

Seckel.—The cultivation of this popular fruit is, in this State, in four cases out of five, a complete failure; the trees neither grow nor bear; double-worked on the quince, it has succeeded tolerably in some instances.

Fulton—best; a native of Maine, and is here what the Seckel is in Pennsylvania.

Jalousie de Fontenay Vendée—so far as two years' trial goes, we think very highly of.

White Doyenné—best; on quince, in most localities as good as in olden time.

Urbaniste—very good; pear or quince.

Napoleon—very good; pear or quince.

McLaughlin—a native of Maine, very good on pear only.

Duchesse d'Angoulême—very good, hardy and fine, on quince only.

Glout Morceau—very good; more productive on quince than on pear.

Passe Colmar—very good; best on quince, very hardy and desirable; liable to overbear.

Winter Nelis—best; productive, and equally good on pear and quince.

Beurré d'Aremberg.—Several varieties are cultivated under this name, two of which are similar, yet we think distinct, and answer to the description in standard works; best, very productive on quince, high flavor, and much esteemed.

Vicar of Winkfield—good; often very good; improves with age of tree; most productive and profitable; a good cooking pear also, and can be grown cheaper per bushel, for this purpose, than any other.

QUINCES.

Fine crops of the apple or orange variety have been grown in the western part of the State and in the valley of the Kennebeck; but in other portions the winter is too severe, and they generally fail.

GRAPES.

The finer foreign grapes—as *Hamburg*, *Chasselas*, *Muscat*, &c.—ripen as well under glass in cold houses as in any other State; but for open culture, we greatly need a good variety at least a month earlier than the *Isabella*, which rarely matures perfectly, and the *Catawba* never—such a one we are not without hope of obtaining from among the many seedlings now on trial.

PLUMS.

Great quantities of this fruit are raised in Maine, but most successfully on the Penobscot river, in Bangor and vicinity, where plums meet a ready sale at prices from three to five dollars per bushel. The following are most cultivated:

McLaughlin—we consider this the best, and is faultless.

Washington—firstrate, and a good bearer in Maine.

Jefferson—firstrate, and a great bearer.

Green Gage—firstrate; well known where the plum is cultivated.

Imperial Gage—firstrate; very productive and profitable.

Bleecker's Gage—firstrate; hardy, and a good bearer.

Columbia—good, showy, and a great bearer; large and handsome.

Royal Hâtive—firstrate; early plum, preferred here to the Purple Gage.

Purple Favorite—firstrate, productive, and fine flavor.

Corse's Nota Bene—firstrate; one of the best purple plums, and hardy.

Lombard or *Bleecker's Scarlet*—good in all soils, and productive.

White Magnum Bonum, or *Yellow Egg*—second rate, large plum; very popular for preserves.

Among other plums highly esteemed are the Imperial *Ottoman*, *Drap d'Or*, *Lawrence's Favorite*, *Smith's Orleans*, *Yellow Gage*, *Hudson Gage*, and Apricot.

CHERRIES.

This fruit is not extensively cultivated in Maine, with the exception of the *Kentish*. This is the hardiest and most reliable in this State, as it will thrive farther north than any other; add to this May Duke, Belle de Choisy, Black Eagle, Downer's Late, Elton, and Downton.

From experiments in progress we hope that the Mahaleb stock may do for us with this fruit what the quince stock has done for the pear.

GOOSEBERRIES.

This fruit is cultivated by many persons in the State somewhat extensively, and thousands of plants have been imported from England, and most of the fine English varieties succeed well in many localities. They grow to a very large size, but for quality and productiveness the Houghton's Seedling and American Hybrid sort surpass them all, and, as they have never been known to mildew in any situation, are deservedly held in high esteem.

Joseph Sinclair, of Levant, in 1848, purchased one plant of this variety, paying therefor twenty-five cents. He has sold from layers and slips which he has multiplied from the said plant over fifty dollars' worth, and has one hundred plants on hand at the date of this report. It would be safe to say he has received a profit of sixty dollars on his outlay of twenty-five cents.

RASPBERRIES.

Fastolf, *Franconia*, *and Knevel's Giant* are uniformly fine, and give satisfaction Antwerps often fail. River's large-fruited monthly promises well.

Strawberries are not *extensively* cultivated in Maine. Our fields

abound with wild ones, which are mostly used. Among those mostly cultivated are,

Hovey's Seedling.
Early Virginia.
Jenny's Seedling.
Boston Pine.

To conclude, we believe that it is only necessary for us, in order to produce an ample supply of the most delicious fruit, to understand what varieties best suit our climate, combining in the greatest degree the requisites of hardihood, vigor of growth, productiveness, and high quality, and to act accordingly.

All which is respectfully submitted.

HENRY LITTLE, *of Bangor.*
EZEKIEL HOLMES, *of Winthrop.*
S. L. GOODALE, *of Saco.*
B. F. NOURSE, *of Bangor.*
ALEX. JOHNSON, Jr., *of Wiscasset.*

REPORT FROM VERMONT.

The season the past year in Vermont has been a peculiar one for fruit culture. The winter commenced at least three weeks earlier than usual, suddenly, and when trees had scarcely stopped growing; consequently, they were much winter-killed by the most severe winter with us for many years. Nurserymen suffered severely, particularly in Seedling Pears; many—in fact most of them—were lost by "heaving out," which I had never before known to any extent.

The spring was cold, late, and very dry—very little rain in March and April—less than three-fourths of an inch in May; so that as a whole it may be noted as one of the worst seasons ever known for planting trees of every description.

The season was about ten days later than an average—apple trees not in bloom until the last of May.

Apples are the fruit of Vermont, a large portion of the inhabitants out of villages having no other, excepting the most common plums. The crop this season is perhaps less than half an average. The early part of June was cold and wet, and, although they flowered very full, the cold, wet weather caused a large portion to drop when the size of peas.

Pears.—The same as apples.

Plums.—Very abundant. From the most delicate sorts down to the Canada or native plum of many parts of the State, the trees are literally breaking under their loads of fruit.

Grapes.—Same as plums; no mildew.

Diseases.—The apple under ordinary culture is healthy; no special diseases. The borer in some places is troublesome to young trees, but not generally.

Pears.—Old trees uniformly healthy. Young trees *sometimes* injured by *blight*. This is, however, *very* little known, but increasing. No remedy but cutting off.

Plums.—Generally healthy. In some parts of the State there is some

complaint of *black knots;* but in Burlington, and north, in the Valley of the lake, all diseases of plum trees are unknown.

Varieties.—The State having apples introduced from Canada by merchants in the lumber trade, and by settlers from Massachusetts, Rhode Island, and Connecticut without names, has many sorts cultivated extensively with only local names Among well known varieties, the *Rhode Island Greening* is most extensively cultivated. Hardy and productive in all parts of the State.

Baldwin.—Hardy and productive. Were I limited to one sort, it should be the Baldwin.

Roxbury Russet.—Hardy, good bearer, but not so great a bearer as the Baldwin.

Esopus Spitzenberg.—Much cultivated; is apt to be spotted; too tender for all parts of the State.

Newtown Pippin.—Too tender, excepting for the most favorable locations. Some seasons good, others worthless.

Northern Spy.—Not yet fully proved; no apple grows better or appears more hardy. Fruit this season fair, and looks as well as any sort whatever; has not before fruited in the State, excepting a few specimens.

Summer Apples.—Early Harvest and Bough are among the most common old sorts, and good in perfection.

Red Astrachan.—Hardy and very fair.

Duchess of Oldenburgh.—Same.

Autumn.—Gravenstein.—Hardy, and one of the best, if not *the* best autumn apple.

Porter.—Hardy and productive.

Many new sorts are in course of trial. Some cultivators can exhibit more than 100 named varieties, but their culture has not been extensive enough to speak with much confidence. Of *seedlings* there are many on trial in various parts of the State, and some believed to be fully equal to any known sorts.

PEARS.

The *White Doyenné* is the most common of old sorts, and is healthy in all parts of the State. Fruit fair.

Dearborn's Seedling.—Very hardy and productive.

Bartlett.—Grows well near the lake and warm parts of the State. Too tender for the colder portions.

Vicar of Winkfield.—Hardy, but requires too long a season for all parts of the State.

Seckel.—Very hardy.

Pears on Quince have only been cultivated a few years. Many are now planted yearly. They so far promise well, and have not been injured by winter. The various sorts of pears have not been sufficiently cultivated to speak with confidence of their comparative merits.

Large collections of both foreign and native sorts have been made, and many are bearing; and in a few years *reliable* notes may be taken. In no part of the country do they promise better than in many parts of this State, and *generally*, so far, no disease among them.

PLUMS.

Many parts of the State are *natural* places for plums I have

succeeded in growing every variety tried, (more than 50,) excepting the peach plum, which so far has proved too delicate for our climate.

GRAPES.

Miller's Burgundy and White Sweet Water are the most common foreign sorts, and ripen well. The *Isabella* requires favorable location. *Catawba*, hardy, but too late. The native grapes of New England are generally cultivated, and seedlings are every year increasing, some of which promise well.

There have been introduced within a few years pears and apples from every portion of the United States, which, with many seedlings, are in course of trial. Before another convention, reliable notes of a long number of pears and apples may be made, which, *with notes* of climate, will be of general interest.

C. GOODRICH.

BURLINGTON, *August* 26, 1852.

REPORT FROM NEW YORK.

A long residence in what is known as Western New York, (at Rochester,) enables me to give some of the early impressions relative to fruit trees, as well as the numerous fruit grown there, within 35 years last past in that location.

Coming from New Hampshire, a State which had hardly grown peaches, I remember with what zest I ate the first peach I ever saw at Rochester; and it is a fact worth remembrance, that 35 years ago, the Royal Kensington peach was grown in the virgin soil of Monroe, then Genesee county.

My father, in the year 1817, purchased the first dozen of peaches which he saw there, and, as he had just located what he deemed his home lot, he, with great care, kept and planted the *pits* of the peaches mentioned. From them seven fine, thrifty trees sprung up, which at their bearing proved identical with the peaches he bought, and which were the Royal Kensington variety. Those trees were moved to another lot and most of them lived 25 years, fine bearing trees; and the variety was generally propagated from them.

It is also within my recollection that a tree of the *Yellow Melacoton* variety was grown in a neighbor's yard, which produced the best fruit of that kind I have ever seen. That was also a seedling tree.

It is also well remembered that so spontaneously did the peach tree grow there, and so plenty was the fruit as early as 1821 to 1825, that growers many times have thrown their peaches from their market wagons into the river sooner than sell them for less than twenty cents per bushel.

It may be asked why peaches now command, in ordinary seasons at this point, from two to three dollars per basket? It is because a second planting of trees did not take place till very recently, and that the trees are more or less affected by the disease known as the *yellows*, and by the depredations of the *borer*, which all growers should know and exterminate from the roots.

The *curculio*, not satisfied with taking the cherries to some extent, as

well as the apricots and plums, does not mind the rough coat of the peach, but, with the daring of a dastardly enemy, punctures the peach, determined to keep himself alive to all generations.

A great deal has been said of him, but he is fearless of everything but being *drummed off the trees* and having his head *decapitated*, which is the only way to get rid of him, including the destruction of all the fruit that falls to the ground, *in which he seeks to perpetuate himself*.

I have cited the peach first, because it was one of the fruits most easily grown, and the trees come into bearing earlier than the apple.

To this day no fruit is more highly prized. And in no clime or latitude do better ones grow, both for size, beauty, and flavor.

Our seasons vary so much, and the country has been cleared of the forests to such an extent, (except in some locations,) that a good crop cannot at all times be depended upon. Near Lake Ontario, within a few miles of Rochester, in the light soil of that region, the best peaches are grown. This season, from the late spring and inclemency of the weather, in cold rains, &c., &c., the crop will prove a failure. The *heading-in system*, for the renewal of the trees, as recommended, is highly approved by all attentive observers, and carried out to a great extent.

I subjoin a list of varieties grown there for market as well as home purposes.

Early Ann, Large Early York, George the Fourth, Lemon Cling, Yellow Alberge, Crawford's Early, Royal Kensington, Grosse Mignonne, Morris's White, Old Mixon Freestone, Red Cheek Melacoton, Snow Peach, Crawford's Late Melacoton, Druid Hill.

Crawford's Late is raised mostly for market, and large quantities are sent to the Canadas and both east and west of us.

N. B. It is notorious that the "yellows" mentioned was first introduced there in trees imported from New Jersey.

Hard winters often injure the trees, and from different causes they are short-lived now in the latitude of Rochester, 43°.

CURRANTS.

All the different kinds of currants have been introduced by the nurserymen, and are generally cultivated.

Varieties grown.—Red Dutch, Red Knight's Sweet, Victoria, Cherry, (very large,) White Dutch, White Grape, Black English.

Currant wine is extensively made with it.

GOOSEBERRIES.

Red varieties.—Albion, Crown Bob, Echo, Haughton's Boggart, Ironmonger, Roaring Lion.

White.—Chorister, Queen Caroline, Smiling Beauty, White Murlin.

Green.—Chippendale, Green Mountain, Green Willow.

Houghton's Seedling, green and red, prove the best bearers, and are free from mildew.

STRAWBERRIES.

I feel assured that in no portion of our common country is more attention paid to the good qualities of this choice and valuable berry. It has been found that a light loam, well enriched, produces the best crop, and the fruit does not throw out the roots, causing their destruction in the

spring. The placing litter of straw or leaves over the vines in the winter is a sure and necessary protection, and while growing the fruit the plan of placing *straw* under the vines not only answers the purpose of *mulching*, but keeps the fruit clean for market.

We have noticed this particularly this season in quantities brought for sale—the fruit was free from sand, and had a *lustre* upon it which the sun produces on well-ripened berries. The kinds mostly grown are—

Large Early Scarlet—very productive.

Boston Pine—a tolerable bearer and of fine flavor.

Burr's New Pine—esteemed as the best berry grown, and *very prolific*.

Hovey's Seedling—grows large in size but not always juicy, and not to be depended upon as a bearer; but should be in all collections.

Burr's Rival Hudson—much esteemed for preserving; bears well, and keeps well when preserved.

Bishop's Orange, *Black Prince*, *Jenney's Seedling*, and *Cushing* are grown somewhat, but not extensively.

A judicious committee have recommended *Burr's New Pine*, *Large Early Scarlet*, *Hovey's Seedling*, *Rival Hudson*, (late sorts,) and *Crimson Cone*. I would add, *Boston Pine* and *Cushing*.

Several new seedlings have been shown, but time will determine their merits.

It is conceded, and so acknowledged here, that *Burr's New Pine*, for all purposes, is the best; and it is the only berry sweet enough without the addition of sugar. A very extensive cultivation of them is being commenced, so that, when, *fully in the field*, consumers can be satisfied with this great delicacy of the season.

CHERRIES.

Perhaps no country has ever produced the cherry in greater perfection; and I believe the tree is free from disease, and is never known to be *bark-bound nor to crack*.

A great number, as many as forty varieties, were shown at the Horticultural Society's exhibition. In class No. 1 are the

Belle Magnifique.
Belle de Choisy.
Black Tartarian.
Black Eagle.
Black Heart.
Burr's Seedling.
Bigarreau, or Yellow Spanish
Carnation.
Downer's Late Red.
Elton.
Elk Horn.
Napoleon Bigarreau.
May Duke.
Reine Hortense.
Sparhawk's Honey.

The last named, with *Belle de Choisy* and *Belle Magnifique*, may be put down as the very choicest.

Professor Kirtland's seedlings will, by the next season, be far enough advanced to be tested.

The *Belle Magnifique* I saw in large quantities on a tree at Ellwanger and Barry's, this day, (August 10.) The *cherry tree dwarfed* is one of the most ornamental for borders, and is the true way to cultivate them where a family supply only is wanted, and but a small piece of ground is cultivated.

Morello, (English,) for preserving, is one of the most desirable grown.

APRICOTS.

This fine fruit, when perfected there, is superior, and the trees thrive well under the same culture as the peach. Trained to a wall or on the south side of a house, is the most preferable way. The *curculio* is its enemy, and very much of the fruit is stung.

Varieties grown—

Breda.
Early Golden.
Large Early.
Moorpark.
Orange.
Peach.
Purple or Black.

PLUMS.

The plum tree has been affected to a great extent by a black fungus, which is evidently a disease, and *certain death* to the tree, although the trees sometimes live a long time after an attack. It destroys in a great measure the bearing properties; otherwise the plum does well, except some varieties, which are subject to rot while the fruit is maturing.

Varieties grown with us—

Bleecker's Gage.
Bolmar's Washington.
Duane's Purple.
Emerald Drop.
Early Orleans.
Green Gage.
Huling's Superb.
Imperial Gage.
Jefferson.
Reine Claude De Bavay.
Red and Yellow Magnum Bonum.
Smith's Orleans.
Winter or Late Damson.
Yellow Gage.

The *curculio* is particularly partial to the plum, and a half crop is as much as can ever be expected, in consequence of its ravages.

PEARS.

This delicious fruit is being extensively cultivated.

Large orchards are being planted, extending from what is known as Cayuga county, to the extreme western part of the State. Great attention is bestowed upon the tree.

Over-culture is of more danger to the tree than neglect, as it has been shown conclusively that a too rapid growth in the young branches makes the tree susceptible to *blight*.

When possible, trees should be planted running east and west, giving a free circulation of air. *Mulching* has been recommended, and all who have tried the plan agree in its utility. In garden culture, the pear tree *dwarfed* is one of ornament, and we know of no more beautiful sight than long borders of *dwarf pear trees* hanging with fruit.

Perhaps no one subject has baffled cultivators so much as the cause and remedy for the blight. Mr. Downing has stated that our soil, when too much enriched, gives the trees too rapid growth, and that the extreme heat of the sun during the season of growth produces the *blight* in its worst form. Mr. Barry is sanguine that it is disappearing. An inspection of E. Barry's pear trees, well fruited, has been to me a most interesting sight.

The foreign varieties found to thrive with us have been cultivated extensively, and to the nurserymen are all classes indebted for their introduction. While we claim that our native pears are not excelled (if equalled) by foreign ones, we think much interest, and sometimes profit, results from the growth of foreign kinds. The Seckel and Doyenné, the Bartlett and Swan's Orange, with the Oswego Beurré, ought to satisfy all, as they generally do.

Pears.—Summer varieties grown with us—

Bloodgood.
Canandaigua.
Dearborn's Seedling.
Doyenné d'Ete.
Madeleine.
Osband's Summer.
Tyson.

The *Canandaigua* is a New York pear, similar to the Bartlett, and nearly as large; ripens early. *Osband's Summer*, also a New York fruit, is kin to the Virgalieu or White Doyenné, a delicious and handsome fruit, and very juicy; ripens by 20th August.

Autumn Pears.

Buffum.
Beurré Bosc.
Beurré Diel.
Dix.
Napoleon.
Onondaga or Swan's Orange.
Stevens's Genesee.
Duchesse d'Angoulème.
Flemish Beauty.
Henry IV.
Louise Bonne de Jersey.
Seckel.
Oswego Beurré.
Van Mons Leon Le Clerc.

Oswego Beurré—a New York fruit, of medium size, juicy and fine flavored; one of the very best, of a russet brown color; productive.

Onondaga or *Swan's Osage*—a New York fruit, large, *vinous in flavor*, melting; one of the best. Trees productive.

Bartlett—Tree produces well; fruit highly prized; tree is one of the most thrifty in its growth, as well as beautiful in shape.

White Doyenné, Virgalieu, of New York; Butter, of Philadelphia; St. Michael's, of Boston, are growing in large quantities for market. Trees prolific; no pears rank higher.

APPLES.

This important and useful fruit is extensively grown with us, and is exported in large quantities to the eastern States. Perhaps it is safe to say that Monroe, Ontario, Livingston, and Orleans counties produce from two hundred to two hundred and fifty thousand barrels annually. Since horticulture has been made a study by the farmer, as it has more or less been, and by the influence exerted over the public by the aid of horticultural societies, the producers have found that consumers have become more particular about kinds. Now, when orchards are to be planted the choicest kinds of trees are required, and for market the Esopus Spitzenberg, Baldwin, Roxbury Russet, Rhode Island Greening, Swaar, Talman Sweeting, Seek-no-further, Pearmain, Twenty-ounce apple, and Vandevere are sought for.

Within a few years others than some of the old varieties have been originated, and a demand follows the growth of them. Of the new kinds, the Northern Spy and Norton's Melon, (winter varieties,) have been extensively introduced. The Northern Spy is a most important variety. The tree is a thrifty grower, and later, by two weeks, in its blossoming, than all other but the "Russet" apples, and thus escapes late frosts in spring. *It bears well*, needs good cultivation, and worthy, in all particulars, of all the attention bestowed upon it. The fruit attains *good size*, is a beautiful striped apple, high colored, and keeps as late as the 15th of June in perfection; commences to ripen in April, and first rate for cooking, as well as dessert. Gentlemen who know the fruit have planted large quantities of the *trees*. Mr. Allen and Mr. Hodge, of Black Rock, have each put out six hundred of the trees, and are sanguine of success. When I tell this Congress that it commands from three to five dollars where the apple is produced in considerable quantities, and has been sold by the barrel this season, in the commercial emporium of our country, at *nine dollars* per barrel, for the use of the good livers at the "Astor House," it will not be disputed that there is some virtue in the apple.

When the fruit becomes plenty, as it probably will within two years more, as large orchards have been grafted with the kind, and when it, with the Canada Red, or Nonsuch, Norton's Melon, Pomme Grise, and Wagener, can be had plentifully, a new era will have arrived in apple culture and production—everything desirable will then be attained. I subjoin a list of the different kinds of their season, as grown with us:

Summer kinds.—Early Harvest, Williams's Favorite, Red Astrachan, Early Joe, Early Strawberry, Summer Rose.

Autumn varieties.—Alexander, Autumn Strawberry, Dyer, Fall Pippin, Hawley or Dowse, Maiden's Blush, Porter, Lowell, St. Lawrence,

Gravenstein, Holland Pippin. The Hawley and St. Lawrence are two of the best fall apples, and should be in all collections.

Winter varieties.—Baldwin, Vandevere, Yellow Bell Flower, Blue Pearmain, Peck's Pleasant, Esopus Spitzenberg, Twenty-ounce apple, Swaar, Fameuse, Canada Red, Pomme Grise, Rhode Island Greening, Norton's Melon, Northern Spy, Winter Pearmain, Golden Russet, Newtown Pippin, Jonathan, Wagener, Cornish Gilliflower, Hubbardston Nonsuch, Rambo, Domine, Canada Reinette, and Roxbury Russet.

Sweet Apples.—Baily Sweeting, Green Sweeting, Talman Sweeting, Golden Sweet, and Early Sweet Bough.

The wheat lands, as well as the lighter soils near the lake shore, produce the apple in perfection. Disease seldom attacks the trees. Some seasons black blotches are seen upon the fruit, but generally it is fair.

QUINCES.

The Apple or Orange and Portugal are grown. Blight affects the trees occasionally, but good crops are had generally.

GRAPES.

In ordinary seasons the Isabella grapes with us ripen, but not so with the Catawba; both varieties, when well ripened, will compare with the best we have seen from Croton Point.

The Clinton is earlier than the others, and usually ripens here; dark in color, and highly flavored. The Sweet-water grows finely likewise.

Our nurserymen succeed well in cultivating the foreign varieties, and could have presented them vying with those on the tables to-day.

In closing my report, (which I have deemed a most important task to complete acceptably to the Congress,) I trust that any errors made may be attributed to inadvertence. If the cause of fruit culture shall in any way be promoted by my efforts, my ambition will be fully satisfied.

JAMES H. WATTS.

III.

MISCELLANEOUS NOTICES AND INFORMATION.

Judging from all the returns that have reached the Patent Office, the farmers of Ohio produce not only more wheat in the aggregate than those of any other State, but more bushels per acre, on an average. Mr. J. F. Willis, of Fayette county, says that "wheat has been very good for three years; average, 20 bushels per acre. It is most commonly sown on corn grounds, and Timothy seed is also sown at the same time, to be followed by clover sown in March or April."

Fayette county produced 1,570,114 bushels of corn in 1851; which Mr. W. estimates at 25 cents a bushel, and the yield per acre at 45 bushels.

Mr. Wm. R. Van Arsdale of Monroe county, Missouri, writing under date of January 3, 1852, says: "The past season was unfavorable. There was too much rain from March till June, and more from early June till late in August. During the months of October and November there was a great quantify of rain again, which was very injurious to young wheat sown in September. Corn was also badly injured; the wet preventing the ears from drying."

Corn was so much damaged in extensive districts that it was difficult to obtain good seed for planting in the spring of 1852.

Mr. Van A. has favored the office with somewhat extended observations of a meteorological character, which a want of room excludes from this report.

Mr. Renel McArthur, of Wayne, Erie county, Pa., informs us that he has some "conclusive testimony" on the subject of wheat turning to chess, which is given in the following words: "Some years ago a neighbor of mine had a field of wheat in which there were small patches where wheat and chess grew on the same stalk and on the same head. The stems that bore chess came about midway out of the head of wheat, and grew from two to three inches in length, and hung full of chess. This strange fact has established the doctrine in this place, that wheat will turn to chess."

We have seen precisely such heads of wheat and chess as our correspondent describes, but instead of the wheat and chess having but a single stem, the latter was separated from the stem on which it grew, and its fine thread-like tendril was inserted into the head of wheat, not by the hand of man, but by the wind whipping the heads of chess and wheat together until by accident some part of the chess heads become entangled by their filaments round the rachis of wheat, and appear to grow there. The botanical difference between these two grasses is quite as marked, and incapable of such a monstrosity as our correspondent supposes, as would be the growth of heads of wheat on ears of corn, or ears of maize on wheat heads. Chess makes good hay, and its seed grows as well as oats or herdsgrass.

Mr. Smith, of Waldo county, Maine, says that farmers sow two bushels

of seed wheat per acre, and harvest twelve, which sells at a dollar and twenty-five cents per bushel. Hay is worth from $15 to $30 a ton, according to the season of the year and the scarcity of the article. Mr. Smith makes one valuable suggestion, which is that "colts should never be made to stand upon a bare floor until they have got their growth, or are old enough to be shod. Ninety-nine horses in one hundred that are lame in their fore feet become so by standing on a naked plank floor when colts." He remarks, "The practice of keeping manure under cover is believed to be far the best, and lime is used by most farmers."

Mr. Samuel Fithian, of Cumberland county, New Jersey, prepares land for wheat by ploughing in a crop of clover, and sowing 200 pounds of guano per acre, by which practice about 20 bushels of wheat are usually harvested per acre. Corn is one of their most profitable crops. Potatoes are extensively cultivated, but from some "cause unexplained," crops have decreased one half in three or four years. Five hundred and sixty pounds of corn (10 bushels) make 100 pounds of pork.

Mr. John H. Tarr, of Mount Vernon, Knox county, Ohio, says that—the average crops of wheat there range from 20 to 25 bushels per acre, although as high as 40 or 50 have been raised. He recommends summer fallowing and ploughing eight inches deep. Soil mostly sandy loam. That region has suffered both from Hessian flies and weevils; and Mr. T. knows no remedy. Potatoes have been nearly exempt from the rot, and where the ground is properly tilled yield from 250 to 300 bushels per acre.

Mr. J. A. Carpenter, of Waukesha, Wisconsin, says that wheat is less cultivated there now than a few years ago, and that "Canada chut wheat" is the most popular variety. Instead of ploughing over the whole farm, a considerable part of it is seeded and kept in meadows and pasturage.

Mr. Charles G. Goodrich, of Franklin county, Maine, regards the rearing of horses in that State as not particularly profitable. He estimates the expense of a colt, when three years old, at $60, which is nearly the average value of the animal at that age. A firstrate horse, at from six to ten years old, is worth from $150 to $200. The Messenger breed stands highest in the public estimation. Clover hay does not injure horses if properly cured; if allowed to become musty, it affects the lungs of the horse, and may bring on organic disease.

COTTON-CATERPILLAR, RUST, AND ROT.

The Hon. E. Ford, of Spring Cottage, Mississippi, says:

"After a respite of two years, planters are again assailed by the cotton-caterpillar, and also by rust and rot; but the damage to the present crops, (1852,) is not serious, as the infection was late in the season. I apprehend more injury next year, from my knowledge of the nature and history of the worm and rot, of which I can decide more conclusively at the close of this season, by comparing my experiments, observations, and notes of this yearwith those of an earlier date. The results of my researches I will send for your next Report.

The rust of this season is, I think, attributable to the peculiarity o

the season—irregular and partial showers of rain and cold east winds. I have observed it this season upon oats, rice, rye, corn, cotton and some shrubs; whereas it usually appears here only on wheat and cotton.

"The rot is of four kinds, or it may be traced to four different causes in cotton. First, the boll is injured by an insect, (what it is I have not yet discovered,) but the puncture is to the core of the boll, and looks as though it was done with a pin or needle; is done at night, by which the boll is poisoned, and rots in 24 to 48 hours in damp weather. Another kind of rot is produced by long-continued rains, and is called 'the wet rot.' A third kind is caused by the boll worm that eats into the boll. The most disastrous damage results from the piercing of the boll by the unknown insect first referred to, which during a rainy season assumes the form of an epidemic and destroys the whole crop, as was the case in the year 1818. The malady continued gradually to abate till 1824. The latter description of rot and caterpillar both made their appearance here on cotton in 1818. The worm disappeared in 1819, and reappeared in 1832. The former description of rot (fomenting I call it) appeared in 1818; continued to 1824; then disappeared, and reappeared in 1852. It has not done much damage this season, as it was late before it occurred.

"I see many correspondents of newspapers in different parts of the country state that the rot is caused by the boll worm. It may be so in other districts, but the rot here is of the kind I have named, although a careless observer would not notice the difference."

ROTATION OF CROPS, AND PRACTICAL SUGGESTIONS.

Mr. John Young, of Richland county, Ohio, thus describes his system of rotation of crops: "My system of rotation of crops is to plough down as heavy a crop of clover and sow wheat; then plant corn; then sow oats, and with them four quarts of clover seed, mixed with two of Timothy. The field is in pasture or meadow till the third year, when a crop of clover is again turned in by the plough, to be followed by wheat. By this practice my land now produces much better than it did twenty years ago. The best preventive of the Hessian fly and yellow midge is to sow early; late seeding makes the plants feeble and increases the injury of insects."

Mr. Young sows turnip seed among corn at the last ploughing, and obtains a remunerating crop. The white flat turnip is the variety preferred for culture with corn. He properly remarks that the best fertilizer for meadows is to flood them where it is practicable. Irrigation by small streams and catches is worthy of far more attention than it receives. The meadows of Mr. Y. yield from two to three tons of hay per acre. Well-rotted barnyard manure and plaster are used as a top-dressing for meadows, and Timothy makes the most salable hay. Clover properly cured is regarded as more nutritious for farm stock. By crossing a French Merino ram with large native ewes, Mr. Young has obtained half bloods of good size, and valuable for mutton; while the fleeces are greatly improved in quality and increased in weight and value. He rears pigs in a way that gives a pound of meat for every day they live—killing them when from 300 to 400 days old.

PRACTICAL VALUE OF THE ANALYSIS OF SOILS.

BY PROF. JAMES C. BOOTH.

[Read before the Philadelphia Society for the Promotion of Agriculture, January 6, 1853.]

Having followed the path pursued by many chemists in Europe and America in analyzing soils, with a view to their bearing on the improvement of agriculture, I have become more and more convinced that chemistry has not yet advanced to such perfection that those analyses can have any immediate practical value. Having already dissuaded planters and farmers from having analyses executed under the expectation of an immediate benefit to be derived therefrom, and having freely expressed my views on the subject to members of the agricultural society of this city, I deem it advisable to present a concise expression of those views, and my reasons for holding them, in order to prevent any misunderstanding as to their nature and scope.

As chemistry advanced in analytical accuracy and extent of application to physiology, so the examination of minute constituents in the soil has progressed, and their importance to agriculture urgently insisted on. But since the field has widened before us, we find that our first physiological conclusions were replaced by others, and these again by some still better grounded; from which we may fairly infer that, although the science is progressing, it is still as an art of inferior practical value. The plain farmer, or even the enlightened agriculturist, cannot determine, with rigid accuracy, the exact amount of the constituents of a soil, and then proceed by weight and measure to apply the manures requisite to render that soil productive, because of the extreme difficulties attendant upon accurate analysis, and of our ignorance what precise individual constituent or constituents are requisite to impart fertility. If this cannot be done, the analysis of soils for immediate practical benefit is a manifest injury to the advance of the science of vegetable physiology, as well as its application to agriculture, because the necessary ill success attendant upon the application of changing theory will prejudice the mind of the practical man still further against the real value of theory, and eventually retard thereby the progress of true scientific agriculture. For this reason, in particular, I propose to give my views why the analysis of soils is, at the present time, of no immediate value to the farmer.

1. There is no little difficulty experienced by the chemist in obtaining a fair average of a soil in any single locality, in order to subject it to analysis, because the uppermost part of a soil differs from that subjacent to it by the intermixture of parts of plants and rootlers, and by the influence of greater culture and of atmospheric agents. A very large majority of plain farmers would find a difficulty in doing that which would demand considerable care and skill on the part of the chemist or more enlightened agriculturist. It would be much more difficult to obtain an average sample of the soil of a whole field, because to the above difficulties is often added that of a variation of soil in proximate localities.

Doubtless multiplied analyses of specimens from the same field might give us tolerably correct information in regard to the chemical composition of the soil, and these multiplied by the number of fields in a farm,

might enable us to form a fair opinion on the chemical character of the farm. But the difficulties of such analyses, and their cost, are serious objections, if there were no others, to their practical value to the farmer.

2. Of what value are detached analyses of soils a hundred miles apart, compared with a thorough local investigation of the same soil under very different circumstances of culture? With his usual shrewdness, Berzelius led the way in such an investigation by analyzing elaborately a naturally fertile soil, taken from beneath the action of the plough, and the same soil from above the former, where it had been subjected to years of tillage. The differences were tolerably well marked; but, since he did not present us with several analyses of each, we cannot certainly know whether culture alone had the effect indicated by his two single analyses. In a subject so little known, and fraught with difficulty, such elaborate analyses, multiplied a thousand-fold in different localities and under different circumstances, would establish theory on a firmer basis, and then allow of immediate practical benefit; but not till then. The cost of analyses is a serious objection to their practical benefit. If it were only required to determine the amounts of silica, alumina, oxide of iron, organic matter, and perhaps lime included, the analysis might be performed at a moderate cost, and the constitution of a whole farm determined; but the first three of these are precisely those which constitute the groundwork or base of the soil, not the more solvent or diluent of the potential constituents. These last are determined with difficulty, and at considerable cost of time; and since their accurate determination is necessary, the difficulty and expense of analysis increase in a greater ratio. Having stated that numerous accurate analyses would be necessary to ascertain the chemical constitution of a field or farm, it is evident that expense alone is an impassable bar at present to the wide-spread application of the analysis of soils.

3. The difficulty and uncertainty attendant upon the analysis of soils that has any pretensions to accuracy are such as to render it valueless. Those constituents believed to be of greatest value exist in exceedingly minute quantities in soils, and in an ordinary analysis they are liable to be either left out or grossly exaggerated; in either of which cases, the analysis is useless, because it tells an untruth, and forms an unsound or rather wholly unreliable basis for calculation. Let us examine more narrowly how far what may be called a tolerably correct analysis may be relied on. Alkali, lime, phosphoric, sulphuric and muriatic acids, ammonia, and organic matter, are generally regarded as the fertilizing constituents. Of these, sulphuric acid and lime (including magnesia) may be determined with sufficient accuracy, especially lime, which is often present to the extent of several per cent. The exact determination of chlorine (or muriatic acid) is often impeded from the accompanying organic matter and the volatility of chlorides during evaporation. I would regard inferences drawn from the data of sulphuric and muriatic acids as unsafe in sound farming practice. The precise amount of ammonia is ascertained with difficulty, and the amount given in analyses must be looked upon with some distrust, unless the quantity is unusually large, sufficient to overbalance the errors of analysis. We can ascertain with considerable nicety the amount of organic matter; but of what avail is that knowledge? Are the remaining half decomposed rootlets and organized portions those which give fertility to a soil? or is it that very

unknown humous body, soluble in alkali, and reprecipitable by an acid? This last idea being as yet a mere conjecture, we may summarily dismiss the determination of organic matter, as of no immediate practical utility to the farmer.

Of all the minute constituents in a soil, alkali, or potash, and phosphoric acid, are generally regarded as the greatest cause of fertility; and yet these two are precisely the most obstinate impediments to the accurate analysis of soils. Their precise estimation is attended with difficulty under nearly all circumstances, and peculiarly so where their total amount may fall below one per cent., as in soils. It may be fairly questioned whether the small fraction of one per cent. of phosphoric acid which is usually returned in soil analyses may not often be due to errors of analysis, or be far above or below the true amount. I will assert that no accurate and candid chemist can declare with confidence and truth that he has ever determined, in a soil, the exact amount of this pest of the analyst. Our means of determining it, when in conjunction with alumina, as it is most likely to be or to become in the analysis of soils, are still avowedly imperfect in the hands of the best analytical chemist. There is not much more confidence to be put in the precise estimation of potassa.

It would appear, then, that of all the fertilizing ingredients of a soil, lime can be estimated accurately, but that the precise amounts of the others cannot be given with confidence; while the determination of the most important is the least reliable of all. It is therefore not too strong a conclusion to say that the present practical value of the analysis of soils consists in ascertaining how much lime they contain. Since inferior analyses have been left out of view altogether, and only what may be termed good analyses held under consideration, their uselessness, or rather detriment, to the farmer cannot be too strongly depicted.

4. There is a confirmatory argument against the practical value of soil analyses, which has been so clearly set forth by Major J. F. Lee, of Washington, that I take the liberty of quoting his letter to me on the subject: "We know that on all poor land of proper texture, the application of 200 pounds of guano to the acre will produce fair crops of grain and roots; and this is the difference between a barren and a tolerably fertile soil. Now this guano applies only 6 pounds potash, 24 pounds phosphoric acid, and 34 pounds ammonia. But the acre contains 3,920,000 pounds of soil, (to the depth of a foot.) Can analysis now, or will it in any progress we may reasonably expect it to make, ascertain 1 part of potash in 600,000 parts of foreign matter; or 1 part of phosphoric acid in 150,000 parts of foreign matter; or 1 part of ammonia in 100,000?" It may be answered, without the slightest fear of contradiction, that such determinations are greatly beyond the present power of chemical analysis. Whether they will continue so, I will presently inquire; but the argument is strong against the present value of analysis as applied to soils.

5. Another and I fear a greater objection to the immediate value of soil analyses, is the difficulty of ascertaining how much or what part of a soil should be analyzed. Soil consists of mineral and organic matter in a more or less comminuted state. Suppose that an ultimate analysis were made upon a fair average of soil, ground to the finest powder, would it express the fertile value of the soil during the time we look for remu-

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nerative crops? If, besides finely comminuted matter, it contained gravel or coarse sand, consisting of quartz, feldspar, greenstone, &c., how long a time will be required for the disintegration of the cohering mineral masses, so far as to allow plants to extract the alkali, &c., which they ask for? Even if we make a previous mechanical separation of the very fine from the coarse matter, and subject only the former to analysis, who would be so presumptuous as to predict how much of this fine matter would disintegrate and yield its rich stores to the husbandman in the course of one or more years, or even of a century? The farmer would, doubtless, prefer to know how much benefit he is to reap in his own life-time, than to leave it to posterity in a future of uncertain length.

Guided by these considerations in the analysis of soils, I employed water, slightly acidulated with acid, to extract the fertilizing ingredients, supposing that my analysis would thereby express the now potential qualities of the soil. I am now, however, more thoroughly convinced that, in our present ignorance of the rate of decomposition of mineral aggregates from atmospheric influences and from culture, such assumptions, and, of course, their deduced inferences, are merely conjectural. The farmer has enough to contend with, in varying seasons, the depredations of insects, &c., without basing his practice upon conjecture.

6. Assuming that we could obtain a fair average of a soil from a field, that we could analyze it with accuracy and at little cost, and that we know the rate at which mineral aggregates would yield up their sources of fertility, would such knowledge assist us in determining how much of the several active ingredients is wanting to render that soil fertile? Can any one presume to assert, in the present state of our knowledge, how much each kind of plant demands to insure its luxuriance or productiveness? From the observed effects of guano, bones, ashes, lime, and green sand, as well as from the analyses of ashes of plants, it is fair to infer that ammonia, phosphoric acid, potassa, and lime, possess fertilizing qualities; but the numerical measure of their value is hypothetical, if not conjectural. Much of what we term our knowledge on this subject is an idea floating in the region of hypothesis, and until it alights upon the ground, and can be handled with some degree of certainty by weight and measure, the practical farmer would do well to keep to his well-trodden paths of practice, and rather be content with the accumulating experience of practical trials than depend upon the results of analysis. When lime is applied to land, why is it that one kind is found to produce much more than another? It is certainly not merely because magnesia is present in larger proportion in one than in another; for by far the greater portion of the lime applied to the soil in the United States contains notable quantities of magnesia. Is it because the land has already been saturated with lime? This has not yet been proved by facts. May it not be that one kind of limestone contains more alkali or phosphoric acid than another, although in exceedingly minute quantities? Their presence in limestone has been only recently demonstrated, and the question cannot, therefore, be answered positively. These questions are offered merely to show that we use lime from observation of its value, and not from an absolute knowledge of the cause of its fertilizing effects.

In wood ash, is it alkali, phosphoric or sulphuric acid, or lime, that constitutes its more active principle? In guano, does ammonia or phos-

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phoric acid give its chief fertilizing character? Does phosphoric acid act without reference to the base with which it is united, whether potassa, lime, magnesia, or ammonia? Does sulphuric acid act with greater potency in combination with alkali or with lime? In general, is it of inferior moment in what combination a so-called fertilizing body is employed, or does it always act as a particular compound?

What duty does organic matter perform, and what is its most suitable condition? Does it enter by the rootlets or by the leaves, to fulfil its functions in the organized structure? Is it crenic or apocrenic, or humic acid, or perchance some condition as yet unknown to the chemist, that chiefly exerts its beneficial influence upon vegetation?

When these and numerous other like questions shall have been answered by a fair union and agreement of sound theory and long practice, then may we hope for numerical data for determining how much of each ingredient is required upon a soil. And when analysis shall become so far perfected as to determine with tolerable precision the quantities of the minute ingredients contained in a soil, then can we apply the required substances by weight and measure, and predict with measurable confidence the results of the application.

Lastly, it will be observed that in the preceding part of these remarks I have confined myself exclusively to the consideration of the practical uselessness of the analysis of soils at the present time. Can we look forward to a period when such analyses can be performed with such accuracy, expedition, and moderate cost as to be available to the art of agriculture? I am well satisfied that such an expectation is well founded. Our assay balances can now show the millionth part of the weight placed in them, and may be still further improved. Reasoning from the past, the methods of analysis admit of almost indefinite improvement; and it is highly probable that new analytic processes will be devised of much greater power, rapidity, and accuracy than those at present known, because every journal of chemical science conveys to us monthly, and even weekly, notices of the progress of chemical analyses. But although soil analyses may not be useful at present to the operative farmer, they may be made available for the advance of scientific agriculture; and for this purpose the enlightened agriculturist should lend his aid, by having analyses of soils most accurately performed; not one or two, but numerous analyses of the same soil under varying conditions. Such investigations keeping pace with the advance of vegetable physiology, will the sooner tend to deliver husbandry from the thraldom of empiricism, and place it under the dominion of a rational system. Besides the analysis of soils thus performed, the analysis of ashes of plants and of manures, by throwing light on vegetable physiology, will contribute to the progress of rational agriculture. Above all other things, frequent and carefully-conducted experiments on manures of known composition, and close and continued observation on their effects on various crops, will accumulate a treasure of experience from which sound theory will draw her data, which will then react most beneficially upon the culture of plants. Then may we look for a literal fulfilment of the expression, that "the desert shall blossom as the rose."

Remarks on the foregoing communication, by Daniel Lee.

Baron Liebig raised the expectations of farmers far above what the infancy of chemical science in its application to agriculture, and especially to the analysis of soils, would justify.

Now there is a strong tendency to run into the opposite extreme, and as greatly under-estimate the value of chemical researches as the distinguished Geisen professor prompted the public to over-estimate their importance. The truth lies between these extremes; and we will endeavor to come as near to it as possible in the suggestions that follow.

A few things in agricultural science may be regarded as settled; and taking these as our place of departure, we are to advance (if we can) from things known to such as are unknown, and thereby increase our present stock of scientific knowledge. It is known that solids in a soil do not, and probably cannot, pass through the walls of cells in plants to nourish them as water and gases do; and therefore all solids must be dissolved in water, or reduced to a gaseous condition, before they can enter the roots and circulate through the stems and leaves of vegetables. Without water to permeate every living cell in a growing germ until the plant reaches its full development and maturity, its organization is impossible. Now what is there to prevent a good chemist, familiar with soil analyses, from taking not one or two hundred grains of earth, but a million grains, and ascertaining what organic and inorganic substances rain-water, as it falls from the clouds upon the farmer's fields, will dissolve in three or four summer months, when the growth of plants is most rapid? Let us suppose that there is found only a tenth of a grain of gypsum. This may be separated after Boussingault's plan without difficulty; and the delicate balance used by Professor Booth in the United States mint, or a balance less delicate, will weigh the gypsum. In the case supposed, the quantity of available sulphate of lime in the soil is in the proportion of one part in *ten millions*, as determined in the most satisfactory manner.

Common rain-water contains many foreign bodies besides pure air, ammonia, and carbonic acid, and the presence of these may vitiate the ultimate analysis. The impurity of rain-water is governed in a great degree by the amount of volatile substances and fine dust diffused through the atmosphere in the neighborhood where the rain is precipitated.

M. Barruel, a distinguished French chemist, studied the foreign substances contained in rain-water as it fell in the last six months of the year 1851, in Paris, and found in a cubic metre the following bodies:

Nitrogen	8.36	grammes	= 129	graines.
Nitric acid	19.08	"	= 234	"
Ammonia	3.61	"	= 55.7	"
Chlorine	2.27	"	= 35	"
Lime	6.48	"	= 100	"
Magnesia	2.12	"	= 32.7	"

Allowing the rain to be only 24 inches in twelve months, there would fall 227 pounds of the substances named on an acre in a year. Of this matter 45½ would be nitrogen, 103 nitric acid, 19½ ammonia, 12½ chlorine, 35 lime, and 11 magnesia. Different localities will doubtless furnish unlike results; but the investigations of M. Barruel present a new feature

in agricultural meteorology, and indicate the propriety of distilling water and charging it with pure carbonic acid for determining the soluble constituents of soils.

We entirely agree with Prof. Booth in the worthlessness of most analyses for practical purposes; but, by adopting a new line of observations, many new and valuable facts may be revealed and fully established. There are soils in Monroe county, in the valley of the Genesee, which yield so much carbonate of lime to rain-water, that, when it emerges in springs, and the carbonic acid which holds the mineral in solution escapes into the atmosphere, white *tufa* is deposited on the bottom and sides of the streams. In this way beds of marl are now being formed. These calcareous soils contain only from one to two per cent. of lime, as we have found by numerous analyses. All wells and natural springs abound in sulphates and chloride of lime and magnesia, and plaster beds are not uncommon.

We have never found a soil which contained so much as one per cent. of carbonate of lime that was benefited by liming. One per cent. gives forty tons per acre within twenty inches of the surface; and the roots of clover, maize, and other crops descend deeper than that under favorable circumstances. The least quantity of lime in a soil that will suffice for all useful purposes should be ascertained if possible. Lime goes much further on land that is well drained than on that which is sour from the lack of drainage. On land properly drained and limed by nature or art, stable manure and guano give much better returns than on soils equally well drained, but wanting the calcareous element. As suggested by Prof. Booth, some limestone contains more potash, magnesia, and phosphoric acid than other rocks apparently of equal quality. The elements of fertility, whether in green sand, apatite, marl, granite, and other rocks, manures, mould, or earth, have never been properly studied in this country, if in any other.

Nearly all of the objections to soil analyses urged by Prof. Booth may be obviated by operating on ounces and pounds of soil, instead of grains. No plant can extract a substance from a cubic foot of earth which is not there, and equally within the reach of a skilful analyst. Time, patience, and perseverance will attain the desired result. These researches, however, are too expensive and uncertain for ordinary farmers to pay for making them. They should be made by competent men, employed by the year at suitable educational institutions, or in private laboratories, with all needful apparatus and reagents. If we understand Prof. Booth aright, he is in favor of chemical investigations of this character, as promising beneficial returns for the labor expended. How much chemistry can do for agriculture, is a question to be decided in coming years, not at this time. A suggestion due to chemistry, and relating to lime and granite, may be worth repeating in this place. Carbonic acid is known to attack and decompose the insoluble silicate of potash, as it exists in primitive rocks, by which the alkali is eliminated in a soluble form. To effect this purpose, as well as to burn limestone, a common limekiln is filled with alternate layers of small fragments of granite and limestone, which are burnt in the usual way of burning lime. As the high heat expels carbonic acid from the limestone, it attacks the silicate of potash with increased intensity; and when water is poured over both granite and lime, the granite disintegrates freely, and

the farmer has both lime and potash for his fields, in an available condition. The resources of science are constantly increasing, and need no exaggeration to command popular favor. By promising too much, charlatans greatly retard the substantial progress of the interest which they profess to have so much at heart. If men of high attainments in science would labor more to apply professional knowledge to the advancement of the industrial arts, the vocation of quacks would be less injurious, and, perhaps, ultimately cease altogether. Communicate to educated agriculturists a knowledge of the principles of science in their application to the analysis of soils, manures, and agricultural plants, and they will be better able to separate truth from error, and escape imposition. Farmers should not be content with mere theories, however ingenious, like those of Baron Liebig, Dumas, and ohers, but should weigh all the facts and probabilities that bear upon the case. They must bring science and practice together, for experimental purposes, before the true value of science can be known. Science is young, while art is old. It is unjust, therefore, to expect in the infancy of the one more than is accomplished in the ripened experience of the other. It is not altogether improbable that the essential elements of crops may not be separated, by some cheap process, from soils, rocks, and sea-water, and become articles of commerce, like guano, bone-dust, gypsum, and common salt. The general use of guano extracted from the ocean, and of other commercial manures, is a new idea, and one that promises to be fruitful in great results. Careful experiments, performed by reliable men, will gradually demonstrate what is practicable in analytical science, and what is not. The suggestion of Major Lee, and apparently sustained by Professor Booth, to the effect that elements to the millionth part of the mass cannot be separated and weighed, is erroneous. By the skilful use of the solvent powers of acids and alkalies, aided by heat and pure water, and extending through weeks and months, much additional light may be thrown on the properties and capabilities of soils. The error has been in building theories prematurely, without sufficient data or facts to sustain them. Men of science should work more and theorize less.

QUANTITY OF MILK.

Quantity of milk a cow should give in a year.—In your paper of August 1st, I notice a letter from the clerk to the Carrick-on-Suir Board of Guardians, in which he assumes that 23 cows will yield 140,160 quarts of milk in the year, or over 6,000 quarts for each cow. Experienced farmers have informed me that about 2,000 quarts are a fair produce from a cow. I have the care of a dairy farm on which the cows are fed principally on green crops; the average ground for each cow was 1½ acre; and I annex a statement of the milk from each cow in one year.

Milk in one year measured in the cow-house, from the cows. (As the weeks closed on Saturday night, some months contain five weeks' account.)

	A.	B.	C.	D	E.	F.	G.
1850.	Qua	Quarts.	Quarts.	Quarts.	Quarts.	Quarts.	Quarts.
April.....	226	240	10	90	116	145	218
May.....	349	354	364	42	124	167	321
June.....	191	203	212	.....	55	64	189
July	234	256	261	223	157	2	197
August.....	229	250	286	454	396	.....	161
September...	182	220	223	354	325	295	82
October.....	219	230	241	406	347	362	3
November ..	143	138	159	252	206	218	
December ...	119	119	129	191	148	166	
1851.							
January.....	159	140	154	207	191	191	403
February....	143	145	125	203	145	194	326
March.....	166	157	115	221	187	220	318
Total.....	2,361	2,463	2,279	2,643	2,397	2,024	2,218
Value of milk.	£ s. d. 11 18 1	£ s. d. 12 7 3	£ s. d. 11 2	£ s. d. 13 7 6	£ s. d. 11 19 8	£ s. d. 10 14 0	£ s. d. 12 6 2

A and B were bought new milk in April; C calved in April; D calved in June; E slunk her calf in June; F calved in August; G calved in January. The new milk being sold in town, the cows producing most in winter paid proportionably better than others.—*J. F Youghal, August 7, Dublin Farmers' Gazette.*

IV.

AGRICULTURAL CIRCULAR AND REPLIES.

AGRICULTURAL CIRCULAR.

[UNITED STATES PATENT OFFICE,
Washington, August, 1852.

SIR: It being the duty of the undersigned annually to collect information on the various branches of agriculture, you are addressed with the view of eliciting such information as may be useful to embody in the Report for the present year. The questions are intended rather as hints or suggestions, than to be literally followed in shaping replies. Extending, as they do, over the agricultural products of the whole country, no one person can be expected to reply to all, but to such only as relate to subjects with which he is familiar.

The United States Census will furnish reliable data as to the quantity of grain and other crops, the number of domestic animals, &c., so that such questions are omitted in this Circular. But it is desired to obtain the experience of practical men in whatever relates to the cultivation of the staple crops, together with suggestions as to new processes of culture; the introduction of new varieties of grains, seeds, and plants; the improvements in machines and implements of husbandry; and all like topics of interest to the agriculturist.

The wide circulation given to the Patent Office Reports renders it desirable that all new facts and discoveries *of practical value* relating to American husbandry be recorded in them, and thus preserved in a permanent form, for the use of the public. It is confidently hoped that the efforts of this Bureau to collect such information will be seconded by the agricultural community.

Very respectfully,

THOMAS EWBANK, *Commissioner*.

Information is respectfully solicited on the following and other points belonging to rural affairs:

Wheat.—Is guano used in the production of this crop? And if so, what is the gain in bushels per 100 pounds of the manure? What the

average product per acre—time of seeding and of harvesting—preparation of seed, and quantity used per acre—how many times and how deep do you plough—is the yield per acre increasing or diminishing—your system of rotation in crops—best remedies for Hessian flies and weevils—average price at your nearest market in 1852? What kinds of grass seeds, if any, do you sow with your wheat, and when?

Corn.—Is guano used in the production of this crop? If so, in what way is it applied? What is the gain in bushels per 100 pounds of guano? State the average product per acre—cost of production per bushel—state the best system of culture—best method of feeding, whether whole or ground, cooked or raw. State, if you can, how much grain the manure formed by ten bushels of corn consumed by hogs will add to an acre, if carefully saved and skilfully applied at or before the time of planting. How do you prepare your ground for planting corn, and how far distant are your rows and stalks?

Oats, Barley, Rye, Peas, and Beans.—Average yield of these several crops per acre—quantity of seed used—which crop least exhausting to land—are peas cultivated as a renovating crop, and, if so, with what success?

Clover and Grasses.—Quantity of hay cut per acre—best fertilizers for meadows and pastures—the grass seeds preferred in laying down meadows—quantity sown per acre—cost of growing hay per ton. Does your experience show that red clover is injurious to horses?

Dairy Husbandry.—Average yearly produce of butter or cheese per cow—comparative cost per pound of making butter and cheese—treatment of milk and cream—mode of churning—of putting down butter for market—average price of butter and of cheese.

Neat Cattle.—Cost of rearing till three years old—usual price at that age—value of good dairy cows in spring and in fall—how many pounds of beef will 100 pounds of corn produce—will a given amount of food yield more meat in a Durham, Devon, or Hereford, than in a native animal? How do you break steers to the yoke?

Horses and Mules.—Is the growing of these animals profitable? What is the expense of rearing a colt or mule until three years old? How should brood mares and colts be treated? What is the best way to break young horses and mules for service?

Sheep and Wool.—Is wool-growing profitable—cost per pound of growing coarse or fine wool—are large or small sheep more profitable either for mutton or for their fleeces—how much more does it cost to produce a pound of fine Merino than of ordinary coarse wool? The proportion of lambs annually reared to the number of ewes.

Hogs.—What is the best breed—the cheapest method of producing pork and bacon—how many pounds of meat will 100 pounds of corn yield—the best method of putting up pork, and curing bacon and hams?

Cotton.—Average yield of clean cotton per acre—cost of production per pound—what crops best grown in rotation with cotton—best preventives against rust, army and boll worms—how deep do you usually plough for this crop—have you any experience in subsoiling or deep tillage for cotton—your experience in the use of cotton seed as a fertilizer—how can cotton lands best be improved without resting them? Is guano used, and, if so, with what result?

Sugar Cane.—Is the cane losing its vital force, and becoming more

subject to premature decay than formerly—Can you suggest any improvement in the cultivation of the cane, or the manufacture of sugar—cost of producing sugar per pound? Is guano used; and, if so, with what result?

Rice.—Can rice be successfully cultivated on upland—do you know of any varieties, decidedly superior to others, which deserve increased attention—can you suggest any improvement in the management of rice plantations? Quantity grown per acre.

Tobacco.—Average yield per acre—cost of production per hundred weight or hogshead—decribe any new process of cultivation or curing—crops best grown in rotation to maintain the fertility of tobacco land. Is guano used, and with what result?

Hemp.—Is the culture of hemp on the increase or decrease? Describe any new process of culture or preparation for market—average yield per acre—cost of production per pound.

Root Crops (Turnips, Carrots, Beets, &c.)—Is the cultivation of these roots, as a field crop, on the increase—can you suggest any improvement in preparing land, seeding, after tillage, and feeding? Average product per acre.

Potatoes (Irish and Sweet.)—Average yield per acre—cost of production per bushel—most prolific and profitable varieties—best system of planting, tillage, and manuring.

Fruit Culture.—Is the culture of fruit receiving increased attention—cannot apples enough be grown on an acre to render the crop a very profitable one to the farmer—comparative value of apples and potatoes for feeding hogs and catttle—what varieties best to keep for winter use, and for exportation—do you know any preventive or remedy for the "blight" on pear and apple trees, or the "yellows" on peach trees? The best method of transplanting, budding, grafting, &c. Make any suggestions on the culture of *Grapes* and other fruit, the manufacture of *Wine*, and on *Forest Culture.*

Manures.—What is regarded as the best plan of making and preserving manures from waste? Are *Lime* and *Plaster* used as fertilizers—if so, in what quantity, and how often applied? Is *Guano* used, and with what success? Quantity usually applied per acre.

NOTE.—Please to forward replies as early as convenient—if possible, before the 1st of January, 1853—giving the name, date, post office, county, and State.

WASHINGTON, D. C., *October*, 1852.

SIR: If I succeed in inducing even one of my fair countrywomen to turn her attention to the cultivation of flowers, I shall not think I have written in vain. I ought, perhaps, in addressing one so grave and scientific as yourself, write on the nature, cultivation, and qualities of plants; but nothing is farther from my thoughts. * * * * * * * * * * * * With me the love of flowers is a passion, and when I look around and see their refining influence even upon the uneducated, I can but worship the hand that has placed within the reach of the humblest individual so delightful a pas-

time as the cultivation of flowers. Look at the most ordinary and common-place dwellings covered with climbing plants, and the enclosure embellished with flowers, and it immediately becomes a beautiful object to gaze upon, and involuntarily we suppose the occupants to be refined and educated people. Does a writer wish to excite your interest for a cottage scene, he entwines the lattice with eglantine, and wreathes the door with jassamine and roses; and if he goes still further, he places a fair girl in close contact with the flowers. This is not romance; it is sentiment. Those who have had the good fortune to have a mother who had a fondness for flowers, how, even when she is in the grave, the sight of a flower, or the fragrance borne on the wind from some favorite shrub, will recall the lost one, and stir up pleasing recollections. I would thus have thoughts of me, when in the grave, to steal over the senses of my child. I believe in the moral influence this would exercise over a man struggling and battling with this rough world. There is a strong affinity between the cultivation of perennial and immortal plants, which must lead a thinking mind to a deeper interest. The same sun, the same air and water, are all essentials to the physical growth of both, and the pruning and training are necessary for the grace and beauty of each. The heat of the sun excites the activity of the plants; it increases the disposition of some of their constituent parts for new attractions and combination to obtain substances as may be requisite and proper for new growth; it likewise causes them to reject such matter as would be hurtful to them. Plants have an independent heat of their own; but all physiologists have found it as difficult to account for the spontaneous production of heat in the vegetable as in the animal kingdom. Oxygen gas, one of the constituent parts of atmospheric air, is as necessary to the respiration of man as to the plant; the latter consumes nitrogen, but returns the oxygen for the use of man. How beautiful the designs of Providence, thus to make the different parts of creation contribute to the support of each! Many plants live and bloom independent of the soil—water, sun, and air having been found sufficient for their growth—as the hyacinth and other bulbous plants. We, as a nation, should adopt a national flower, and not be behind England, Ireland, Scotland, or France, in sentiment. And surely from our world of flowers one could be found suitable.

Respectfully,

MARY B. THROCKMORTON.

NEAR TRINITY, LA., *November* 14, 1852.

SIR: Having received two of the Patent Office "Circulars," I cannot but think that it is my duty to give some sort of an answer. I have come to the conclusion that it is not for me to decide, as I was but too willing to do, that I could say nothing that would be of any worth; that is especially your province; and without further preface I proceed to contribute my "mite," if it should prove even a mite, to the knowledge of the country on the subject of cotton. I shall try to answer a few of your questions—those only about which I believe that I may know something. Judicious cultivators on the bottom lands of Black river, in Louisiana, obtain an average product in a series of years of 2,000 pounds of seed cotton to the acre, about 30 per cent. of which is clean marketable

cotton. Its cost of production, according to my calculation, is at least, per pound, 7⅞ cents.

The only crop grown here in rotation with cotton is Indian corn, and we find that it is beneficial.

People here, who have ideas of cleanliness and propriety, get rid of their cotton-seed by speading it on their corn lands; but it is done in a hurry and without method, so that its actual result, though known generally to be favorable, is not precisely ascertained. As a fertilizer, I believe in its great power from experience years back, when I cultivated on the hills where manure was needed for corn. My habit then was to list my corn land with as deep a furrow as I could accomplish very early in January, half fill it with scund cotton-seed, and throw a furrow from each side upon it; afterwards finish the ridges as I had time.

About the 25th of February my corn was planted, opening with a plough not quite down to the cotton-seed, then in a state of decomposition. With such a practice I have produced an average of 60 bushels to the acre; while a neighbor, on land of the same character, has obtained but from 15 to 20 busels. My theory on the subject—and why should not I have a theory, as every body else has in these days?—is, that the carbon evolved in the decomposition (and there are few things that contain more of it than cotton-seed) is, to a great extent, absorbed and retained in the earth. As the season advances, it is gradually extracted, affording a constant supply of necessary food to the plant.

I am confirmed in this view by an experiment on Irish potatoes, which is constantly made here, in consequence of a remark of Liebig's, that humus, from the quantity of carbon which it yielded, was the best manure for potatoes, making them mealy, while stable manure rendered them waxy. The result is always exceedingly well marked, though it must be used very sparingly with potatoes in this warm latitude, too much overwhelming the plant, and producing premature decay, as it does with man here when taken in the form of fat meat and whiskey.

We try to plough here 6 inches deep; and some people say that they always go 7 inches in depth, but with such men the moon is always at full. We do not average much, if anything, over 5 inches.

I am, sir, respectfully, your obedient servant,

H. W. HUNTINGTON.

To the Commissioner of Patents.

Spring Cottage,
Marion County, Mississippi, May 24, 1852.

Sir: In view of the value of the Patent Office Report to the agricultural community of this county, as also to many other interests, I deem it a duty of those who have been solicited to contribute to the work, to report or submit, from time to time, such observations, experiments, and improvements as may be made; the value of which may be determined by you, and published, or not, as you may decide.

Under this view, I will now submit an experiment upon growing peas with or under corn, not only as a profitable crop, but to renovate land by a rotation of crops, as stated in my letter of November, 1850, (Report of 1850–'51.)

Peas.—I am well satisfied by my own observation and experience,

as also by the reports of analyses by scientific men, that the pea vine is as rich in the necessary qualities to improve old lands as anything that the land will produce, and should be preferred under corn for several other reasons: first, that the pea-vine more effectually shades the land against the rays of the sun, after the blade is taken off the corn, than anything else would; and secondly, the pea-crop is very important to the farmer for stock, and, if well managed, is equal to half the corn the same land produces. In 1850, I gathered two hundred and forty bushels clean peas (under corn) on twenty acres of land, and did not get near all, as all were not ripe at the time of picking. That was an average of twelve bushels to the acre under corn.

Some farmers complain of peas killing their stock. That is the result of inattention or carelessness; stock should not be let into a pea field hungry. There is danger in letting a hungry horse or ox into a corn-field, or to a trough full of corn, rice, or potatoes; but first feed, salt and water them, and then turn them into the field, and there is no danger, provided water is convenient and that they are frequently salted; they may remain in the pea-field until the peas are consumed; then horses should be taken off the field, as they will then eat the dry vine, the bark of which will clog them.

Seed peas may be securely kept, as against the weevil, by putting them up in old pork or other barrels, or boxes that have contained salt shortly before. Peas or any kind of grain may be kept perfectly secure against weevils by setting it in barrels or boxes in the smoke-house. The moth or weevil is driven off by smoke or salt.

There is great complaint by correspondents of the weevil, but no particular course recommended by any as a preventive. I do not know whether they can be entirely avoided in the keeping of large quantities of grain; but the damage may be avoided to a considerable extent, in gathering, putting up, and keeping corn, by pursuing the following course: First, a week or two before housing corn, remove from the barn all remains of the old crop of corn, shucks, cobs, and everything of the kind, some distance from the barn, to some out-house, or other house for the purpose; then throw the windows and doors all open, and sweep it out as clean as possible; then throw cold water over the floors and walls, and let it stand open several days; and, on the day you commence housing new corn, wet the floor and walls with salt water, or smoke the barn thoroughly; and, when done housing corn, sprinkle salt water over the top of bulk. Corn should be put up in the shuck, and the ears that chance to be shucked in gathering from the field should be sorted out and placed where they may be first used. I have pursued this course for the last ten years, and my corn has been very little damaged by the weevil in the round of the year.

Sheep.—In my letter, of Report 1850–'51, I stated that sheep would surely do as well in the pine region (as then designated) as perhaps in any other country. I last summer kept thirty-two head of sheep on a crab-grass pasture; in the fall and early part of the winter in the forest, on the herbs and shrubbery of the forest; and then fed them a little, in the months of January and February, on turnips, cabbage leaves, and peas. I now have sixty-two head of sheep, they having nearly doubled the number by natural increase. About one third of the ewes brought and raised two lambs. No effort has been made here to grow wool for

market as yet, though it could surely be profitably done; the only effort made is to grow wool for family use or consumption, and some mutton for market.

Pasture.—It has been very clearly demonstrated by many efforts and experiments, that none of the Northern grasses will flourish in the South. Then the Southern farmer should endeavor to cultivate and improve the native grasses, crop grass, for summer grazing, and preserve reed, cane, and rye, for winter grazing. Nature has furnished the South with all that is necessary to the support in winter and summer of almost innumerable herds of buffalo, deer, and many other kinds of game. We have yet in many parts of the country the same material, that may be preserved and improved by care and attention.

The *Crop Grass.*—If this be cultivated, manured, and given the same attention South that is given clover and other grasses North, it would be as valuable for hay and grazing South as the clover and other grasses North. This grass is the best that can be cultivated South for summer grazing, beyond doubt. Let those that may doubt it try it with the same care and attention that is given the Northern grasses, and they will be satisfied. Rye constitutes an excellent winter pasture for sheep and calves; but the native cane and reed is invaluable as a winter pasture. No Southerner is aware of its value until he is without it.

To preserve and make a good cane pasture, it should be well fenced before the cane is too much broken or exhausted by stock running upon it, winter and summer. After being fenced, all stock should be kept off through the summer months; and if the cane, when fenced, should be old, large, and tall, it should be burned or cut down, and the following winter put on stock enough to feed off the leaf and break down pretty much all the young cane that has shot up. That will make it a bush or shrub cane, from the root of which a new stock springs up every summer.

I have a cane pasture, grown principally from the seed, of about 200 acres. The cane seeded here in the spring of 1829, and the old cane, all dried and fell, and the root all rotted and failed to shoot up the rattoon, or mutton cane, as called by some; but the seed, which in every respect resembled the largest kinds of wheat, fell on and literally covered the ground. The season being favorable, it came up as thick as it could stand on the ground; soon after which I fenced it, to prevent the hogs from rooting it up, and destroying it thereby. It was pastured or fed off every winter by horses and cattle, and would grow out again in the spring and summer. At about 1840 it commenced shooting up from the joint of the root, (the rattoon cane,) and was thereby fully reinstated to primitive maturity. This pasture now sustains 100 head of stock (horses, mules, and cattle) for me through the winter yearly. They are fed—that is, horses and mules—once a week with corn, and all given salt once or twice a week, and they come out in the spring in as fine and good condition as my stock that are fed through the winter. I last fall let some of my stock glean the corn-fields after the crop was gathered, and then turned them on the cane until some time in February. I then sent those to the Mobile market, and they sold as well as the best stall-fed cattle—cows at $20 per head, and steers at $40 per head.

As before said, this pasture will sustain, through the winter months, 100 head of stock, and is worth to me annually from $500 to $1,000, (five dollars per acre.) It would surely cost an average of five dollars per

head to feed stock through the winter, three months, and keep them in good order. I have been offered ten dollars per head to pasture mules and horses through the winter. There is a very great difference between pasturing stock on cane in the winter only and letting stock run upon it in summer and winter. If stock run upon cane in the summer, they will break it entirely by consuming the rattoon cane as it springs up; (hence the necessity of fencing it;) and if they did not destroy it by feeding it down in summer, they would in summer consume the rattoon, and young, tender, luxuriant growth that they need in winter. Reed is as valuable for pasture as cane, and very much the same nature in every respect; but reed flourishes only on low, wet swamps, while the cane does best on the highest ranges of river-bottom lands. I have discovered, by observation and experiment, that it requires ten years for cane grown from the seed to attain full maturity in point of size. How long until it will seed again I know not. It has seeded generally here but once since the year 1810. I have known occasional stalks bloom frequently, but to fill and mature well but once.

I have also discovered that the chain root of the cane may be successfully transplanted, and, though it would be somewhat tedious, would pay well in many instances, as it spreads rapidly by shooting up from the joints of the root, and shooting out other chain-roots at the foot of the new stalks, from which the rattoon springs up at each joint as the chain-root extends itself.

All landholders that have cane upon their lands, though it may be sparse or scattering, will do well to fence and preserve it before it is entirely destroyed, as it will soon reinstate itself when there is stubble or roots. In most of the densely-settled portions of the country the cane is now entirely broken; but in sparsely-settled sections, there may yet be valuable pastures preserved by fencing. I have treated thus lengthily of this subject that others may profit by my observations if they choose so to do.

Very respectfully submitted:

EBEN'R FORD.

EDWARDS, MISSISSIPPI,
November 20, 1852.

SIR: Finding it not possible for me to devote the usual time to the Agricultural Report of your Office which I believe I have uniformly done, yet, desiring to aid in making the Report acceptable, I propose saying all I can in one article on what I hope will be interesting to the Southern planter, viz: hog-raising, and a fault or two in cotton culture.

1st. *On Hog-raising.*—If the owner will provide grass and green food all the year, with an abundance of water, he may count certain upon raising his own meat, provided he keeps them away from peas and cotton seed, and keeps negroes away from them; yet one who has been raising hogs 30 years, * * * * the China crosses the Byfield, the grazier crosses the white Berkshire, the Berkshire the Woburn, (an English hog imported into this State,) as also a stock called Northumberland, from Pennsylvania, and a stock from a butcher in Cincinnati, Ohio, asks permission to say a good stock is all-important, and my preference

is decidedly the Berkshire. I admit my specimens of the Woburn and Berkshire were not good, and the Northumberland I never got to raise from. They went astray during an absence, whereby twenty was a clear loss. My object is to advise making a good selection; then to be careful and select for breeders the most thrifty pigs from a sow which carries a large udder, and becomes thinner in flesh whilst nursing; to spay off old sows that are the reverse; keep no breeders over three years; keep boar up, if possible; not permitted to serve too many sows; and should ten or twelve be on hand at once, turn one into him at a time; permit once serving and turn her out. I have stood by and proved this by taking notes as a record. Boars may be worn down, so that pigs will be feeble. Procure crosses every two or three years. Provide winter grazing by sowing down oats, rye, or barley. Provide summer pasture by setting out Bermuda, and having a good crab-grass pasture. Have an oats field to turn hogs on in June and July, and as at this date hogs will much need extra keeping, if enough, an oats-field with the crab grass which follows; will take bacon hogs to the pea field, potato, and pindar patches; thence to the fattening pen and pickle tub.

At this time the writer is feeding off 73 hogs as follows: either ten bushels of sweet potatoes are boiled until done, then 1½ bushel of meal is well stirred in and boiled; feed when cold; or three bushels of meal made into hasty pudding, with pumpkins, and half bushel of cotton seed, or raw potatoes, or raw corn. These are varied, having the cooked food seasoned with salt. I have different food given each day, but making potatoes my main food. I believe my hog account for the 22 years I have been planting would show that I had sold more meat, by a handsome little amount, than I have had to expend upon fancy stock and fancy prices for meat, viz: 10¼ cents this year.

2d. *The Errors in Cotton Culture.*—Why is it that cotton planters, seeing for a whole lifetime that the best crops are always made in a very dry season, and yet they continue to plant on flat beds and plough them down before June? Why is it that planters will require clean cotton picked from the field, at 100 pounds per hand, say, when they know that their neighbor's cotton, sold by the same merchant, though picked only ordinary brings as much money? The writer, though an advocate for level culture in corn, yet holds to high ridges for cotton, and the ridges to be kept up all the year. It is very true that the land he cultivates will admit high ridges better than thin land; yet, if my first proposition, contained in first query, is true, it seems reasonable that high ridges are best upon thin land. It is also true that the writer is more particular in breaking up than one in a hundred, making it a point to break up every inch, and to do so 6 inches deep if practicable. I have had 9 furrows run in a 4½ feet row, with two good mules to a plough—say a large one-horse plough, or two medium mules to a small one-horse plough. I may yet believe my per acre yield to quality of land will compare favorably with that of any neighbor. The present year I have gathered an average of 1,850 pounds for 20 acres, together with enough left to claim 2,000 pounds; but this is not my full yield, as the rot was awful. I have made 2,400 measured, a field of 40 acres, which I have been (12 years ago) ridiculed for planting when I owned rich land. My last field has now produced 495 pounds; with 8 acres left as yet not picked over, last time—fully 12 or 14 paid thereon—these two pieces in Banana, and both ridges up high, even such

years as this and last year. Last year I gathered an average of 1,000, and only picked over twice—first in August, and last in November. This year picked over five times. These facts warrant me in advocating deep tilth and high ridges. As to the second query, I have been told, in days gone by, how to make a No. 1 sample; and I have tried it, but was never paid. For a few years I have gone in for full weight; exclude as much trash as possible, but care not for a few hulls. This season my head picker averaged 290 pounds every day he picked, up to the first part of November, except one. He was sick nearly all day, and another when it rained at 8 o'clock, and no more picking. His two best days' picking were 529 and 609. The first of these days 10 hands, racing, averaged over 460; and the second day 11 averaged 475, 8 of whom were raised by me. This cotton sold in Vicksburg at 9½, and no neighbor sold a bale at the same time over 9¾. In New Orleans I doubt if there would have been any difference at all. Commission merchants make a very needless talk about clean cotton. I have seen cotton on large plantations on the Mississippi, when on the scaffold, which would show the pieces of bolt cover 100 yards, and some say enough to rattle when poured out of the sack into the basket, and yet they sell at about the same price. I dislike too much leaf, but I would never waste time to make it clean. I have fully tested it; besides, a full crop admits no such work. A small crop will not permit, if improvements, manures, &c., are not neglected.

I am, sir, yours, &c.,

M. W. PHILIPS.

EDWARDS, MISSISSIPI, *August* 31, 1852.

SIR: The increased and increasing interest felt in the cause of agriculture induces me to hope and to ask for a much larger edition of the Agricultural Report from the Patent Office than has yet been issued, and that it may contain articles more valuable to the general interests of these United States and less of some things which are of no sort of consequence to at least the Southern portion, and only advantageous to a small portion elsewhere.

I tender you an article upon the hackneyed subject—corn culture; not that I have any new ideas to advance, nor that I have the vain hope of turning men from their errors, after reading what others have written; but I offer this from what I believe to be facts, which may induce examination, and a consequent attention. I believe I have adopted the true principle in the culture of corn, which my fellow-citizens—South, at least—have not. It is true, I might well hide what I believe is the cause; but if I can do any service to my race I will be well content. There are many readers who examine what I write to know what new theory or humbug I have taken up, from being curious. Thus may I be of use.

Having recently travelled through ten counties of this State, principally north of this, (Hinds,) and seen much of the growing crop, with more acres per hand in corn generally than since I have known this country—twenty two years—heard much and saw more of corn culture than usual, I trust I may be permitted to speak of corn culture.

And, first, I would allude to the one hundred acres here, which were in corn last and this year. The seasons were very similar up to June, the advantage being in favor of 1852, because in February and March the land was in much better condition than in 1851, and the ploughing done better; the stand was better than in 1851, and rains set in earlier; yet the present crop was more injured by the drought, and consequently will yield an average of at least five bushels less, I think. The reason, in my humble opinion: last year my driver obeyed instructions; this year my overseer, though a very excellent man otherwise, thinks he is not bound to obey instructions, and that he will lose reputation by following a plan which "every body and the rest of mankind" have long known to be wrong. Last year the plough was only used, and very shallow, to cover peas, in May; this year, even two horses were used to the sweep, and the plough used once or twice besides, I think.

I will be concise, and I hope full enough for any planter to fully comprehend. I make it a special matter to personally attend to the breaking up of the land intended for corn, unless I have an overseer. I see that all land is broken out, that there be no "cut and cover," that the gearing and rigging of the plough be not changed after once getting the right depth, endeavoring to run them six inches deep. With this intent I put, if ordinary mules or horses, two to one of your one-horse ploughs, and two best to the smallest two-horse, or a large one-horse plough. I break all land into thirty-two feet beds, so that, by running off four-feet rows, the row will not fall in a water-furrow; beginning to plough late enough in February, so as to finish by or about the 1st of March, desiring to have land as freshly ploughed as possible and as late as can be; so that I plant early in March, thereby avoiding the February rains, as much as can be; I *will not plough wet lands*. I lay off rows with a shovel-plough, drop or drill corn about one bushel to two or three acres, and cover always with a harrow, and no board before the hinder teeth, as was done this year—putting in corn enough for birds and a crop too.

Sometimes, when up—that is, when land has not been beaten by rains to become impacted and run together—I run an iron tooth over corn, so as to stir the earth and clean the row, when with three or four blades I run around with a bull-tongue, nicely mould the corn, and, when old enough to bear pulling up, the grain being rotted and birds left the field, I thin, if possible, by hand—provided a rain to soften earth—leaving on the land as many stalks, counting one hundred to the bushel, as will make the crop I count for on the land; thus, if I expect forty bushels, I leave four thousand stalks per acre. I do not like to thin with the hoe, and do it not when I can avoid. Soon after this I pass the harrow once on each side of corn, as near as possible, and, if grass be appearing again, in the middle; and thus I continue until the corn begins to "bunch" for the tassel, when I press up all work to sow peas and "lay by" the corn. I use the shovel-plough when the land becomes impacted by heavy rain, and strive to brush over it before the earth gets quite dry, starting my ploughs and all I can run so soon after the rain as the corn begins to crack. I use sweeps, too, and even turning-ploughs, but only when stormy or wet weather and the harrow will not pulverize the land in time to prevent grass from taking root. The object to prevent turning over land is to kill grass.

Very deep tilth, shallow planting, early and shallow and frequent culture, is my idea of corn culture in this county, which I fearlessly recommend to all my brethren.

Yours, with respect,

M. W. PHILIPS.

TALLADEGA P. O., TALLADEGA COUNTY, ALABAMA.

SIR: Alabama never was blessed with so abundant a crop as this year. In wheat, much more was made than last year—an increase of a fourth, though the quality is not so good. The variety sown most successfully is Orleans. Another variety has lately been introduced by Colonel George Hill, of this county, which is considered by good farmers to be a more desirable wheat than Orleans in several particulars, viz: a stiffer stem—not subject to fall or lodge; makes equally as fair a flour, yields more per acre, and is some eight or ten days earlier in maturing, and of course, a better wheat. It takes the name of its founder, and is called the *Hill wheat*. The greatest yields are from twenty to twenty-five bushels per acre this year in this county.

The manner of preparing land for wheat will differ as the soil and climates differ. The skilful farmer will study the nature of his soil, and take into consideration, at the same time, the balminess or rigor of the climate in which his wheat crop is about to be located.

The best manure applied to wheat, in this county, is cotton-seed, which is applied in different ways. The best manner, however, is, after the wheat has taken good root, and is about to leave the ground, in its upward growth, to haul out your cotton-seed. After having it heated by bulking, so that the principle of vegetation is destroyed, sow it broadcast on the wheat at the rate of thirty or more bushels per acre. Talladega has not heretofore needed much manure; consequently, manure-making has not claimed the attention that it deserves. A few practical farmers are turning their attention that way, and with the aid of the Selma and Tennessee River railroad, great and important changes are destined to take place in our farming operations. At the head of flat-boat navigation, on the Tennessee river, are inexhaustible banks of plaster of Paris, which can be boated down to the railroad terminus at Guntersville, and then transported down the road to the different depôts throughout the length of the road. The guano can be brought up from the seaports in the same way; the lime we have already; and with plaster, guano, cotton seed, and stable and barn-yard manure, our valley can be made anything conceivable in an agricultural point of view. Our farmers have come to the conclusion that they can make more corn, cotton, and wheat, than they have been in the habit of making. No railroad in the history of railroads will equal the Selma and Tennessee River railroad, embracing so many diversified points of interest—not excepting the far-famed Liverpool and Manchester railroad, in England; and no railroad has been prosecuted towards completion with greater energy. The crop of Indian corn has increased at least one-third this year; many farmers making enough to last them two years. Several varieties are grown in the county—the white gourd-seed, yellow flint, red-blaze, shoe-peg, &c. My preference, for early maturing, standing drought

well, yielding most upon thin soil, and least exhausting to land, is obtained by blending the raspberry and yellow flint, or shoe-peg and yellow flint; a sample of which I will forward to the Office. The Patent Office, in absence of an agricultural bureau, should be the national deposite for all improvements, designs, seeds, &c. The rationale of blending these varieties is simply this: No corn has yet equalled the shoe-peg for shelling more to the measure; no corn can equal the yellow flint for yielding meal to the bushel—both being very nutritive. Now blend their properties and you have a very desirable corn. I never plough corn but twice after planting, believing that I would injure corn and land both; and I make as heavy corn as one ever obtains. I endeavor to prepare the land well before planting, and when planted, I consider the corn crop half done. I will make one or two illustrations: In a corn crop in the hill, for instance, lay off your rows three feet apart, (after having the field well subsoiled each way;) this gives 4,840 hills or stalks to the acre; each stalk is expected to have, at least, one ear; sixty ears will more than fill a bushel. Now divide 4,840 by 60, and you have 80 or more bushels per acre. Corn drilled will make more than that. I will give another illustration where the yield can be considerably increased; but take your soil into consideration: In an acre of ground there are 43,560 square feet; now, lay off the rows, giving four square feet to every stalk in the drill, and one foot by subsoiling, making five feet of soil to every stalk—and we think that five feet of soil ought to produce one ear of corn, at least. 43,560 divided by 4 gives 10,890 stalks to the acre—60 ears to the bushel. Divide 10,890 ears by 60, and you have over 181 bushels per acre. I tried this last plan upon a small scale, and succeeded; each stalk brought an ear—on some were two. Your correspondents, speaking of so much hoeing and ploughing corn, certainly make nothing else. How do they have time? And certainly they plough badly, for corn does not require so much, if once well done; it costs too much labor. A small fine ought to be laid on the farmer that habitually buys corn-pork and bacon. Oats, barley, rye, peas, and beans claim our attention. The first writer on agriculture that came under my observation, was the Poet Virgil, and, when speaking of oats, reported unfavorably as to its being a renovating crop. All observing farmers agree, at this day, that oats are an exhausting crop, and not a fertilizing one. A great many oats, however, are grown in this county. The largest yield that has come under my observation, was made by Colonel George Hill, with black or winter oats, producing over 75 bushels per acre.

Perhaps I ought to say something of root-crops before I proceed further. Sweet potatoes and Irish have increased by one-third, at least.

Beets.—I was shown by Colonel McElderry a beat measuring 27 inches round, and a radish measuring 27½ inches round. I considered them by far the largest I had ever seen. The crops of peas and pumpkins have increased in the same ratio. Col. McElderry weighed one pumpkin for the purpose of ascertaining its weight—they appeared so large, and lay so thick on a thirty-acre field of corn—and it weighed 85 pounds. I consider it a mammoth of its species.

Barley draws largely upon the soil, but is a rich and valuable winter pasture. Not cultivated to any extent in Talladega.

Rye is considered by farmers a renovating crop. For stock, it affords an excellent winter pasture; the grain, when chopped and fed to stock, is good food; and when stock, particularly hogs, are turned upon a field of rye, it will make them grow and fatten well. The straw broken down on the field, and ploughed under, makes a tolerably fair manure.

Peas are considered the clover of the South—the cow-pea, I mean. It grows kindly; poor land will produce peas finely, and, if the vine is allowed to remain upon the soil, and ploughed under, it is a great renovator. The pea is good for stock; nothing superior to it in nutritive matter. Beans not cultivated in our county as a field crop. Clover is cultivated by but few in this county; it is receiving more attention now than formerly, and the few who have tried it say that they have every reason to believe that it will succeed well in the valley, as well as farther north. I obtained the seed of the Alfalfa or Chilian clover from Governor Brown, of Florida, last year, and planted it as he directed me, and I find it to grow luxuriantly and vigorously in the hottest and driest weather we have here. It may do for extensive cultivation after we experiment with it a little. Our country, here in Alabama, is naturally intended for the growing of wool. If Scotland ever was, or will be, a wool-growing country, ours will certainly be. Bordering on our valleys are hills or mountain knobs, considerable elevations in places that afford the finest sheep walks and summer pasturage for sheep imaginable. If England can, or Scotland, or Saxony, or even our own countryman, Mr. Cockrill, of Nashville, raise sheep and grow wool upon lands worth fifty dollars per acre, what princely fortunes cannot the Talladega wool-grower realize when sheep-walks and summer pasturage can be had gratis? Our enterprising countryman, Mr. Cockrill, of Nashville, has proved, to the satisfaction of all unprejudiced minds, that the South is the place to grow wool profitably, and the place to grow fine wool. The mildness of our winters, compared with more northern latitudes, will place the advantages of wool-growing always on the side of the Southerner, even if other things were equal; but when we take into consideration the other advantages of the Talladega wool-grower, no comparison can fairly be instituted—the fineness of his wool, the mildness of winter, and cheapness of wintering, and the finest walks and richest summer pastures gratis. What comparison, I say, can be instituted between him and any wool-grower on earth? Between him and a princely fortune, no barrier stands! The question may intrude itself, Why do not the Talladega farmers turn their attention that way; their capital, &c.? The only answer I can make to the inquiry is, cotton, the great Southern staple, has blinded us to what is much more profitable; and, strange to say, wool is grown only for domestic purposes in Talladega county. The next thing that claims the attention of the farmer is his hogs; and the best breed is the native hog, such as we found among the *Indians*. By judicious selection of breeders, any sort of a hog may be raised from the native stock. The manner of putting up pork, and curing bacon and hams, will differ according to climate. We will leave that subject to the Buckeyes of Ohio, and notify them at the same time, that if they even attempt to cure bacon and hams in Talladega, they will have to alter their plan according to climate, or they will save nothing but the skulls and feet, and that by "sousing." With cotton and

rice, the Southern staples, come associated the slavery question. In the cultivation of wheat, corn, rye, barley, oats, and the grasses, slave labor is not so profitable. If the Southern slave-holder realizes any profit at all, it is in a cotton and rice climate exclusively—a land of few enjoyments.

The *cotton crop* of this county will be greater this year than last. The average production has always been considered 1,000 pounds per acre; and some claim more than that.

Every kind of crop succeeds well after cotton. In preparing the land for a cotton crop, it should be subsoiled, and the cultivation light. Cotton lands can be improved by scraping up decayed leaves, limbs, and the mould where these are rotting, and imbedding them in the ridge upon which the cotton is planted. Continue the process, and the land will improve in the production of cotton; and the reason is, these leaves, sticks, limbs, and mould abound in alkalies, and consequently are the very food adapted to the cotton plant. Nothing, we think, has destroyed more land than the cultivation of cotton, the cultivation being pretty much a surface affair. It exposes the land to the exhausting heats of summer, and keeps it in a condition to wash with every rain; and cotton requires later cultivation than any other crop, leaving the farmer no time to prepare manures, or improve his farm as he would desire. Therefore, I say, cotton has destroyed more land than earthquakes, eruptions of burning volcanic mountains, or anything else. Witness the red hills of Georgia and South Carolina, that have produced cotton till the last dying gasp of the soil forbid any further attempt at cultivation, and the land turned out to nature, reminding the traveller, as he views the dilapidated condition of the country, of the ruins of Greece. Rice can be successfully cultivated upon upland. I once made an experiment upon upland rice, an account of which I gave in last Report. An error, however, occured in that Report respecting the quantity of ground. The piece of ground was 60 *yards* by 20, in place of *feet*.

A gentleman of this county has made more by planting a quarter of an acre than I expected. He made 40 bushels of rice; which will make 160 bushels' yield per acre. Rice at four cents per pound (the bushel weighing 30 pounds) makes an income of $192 per acre; surpassing any crop the Southern farmer may plant by a vast majority, if he could get a market and cheap transportation. We look forward to the time when our Selma and Tennessee River railroad will afford us cheap transportation, together with the other advantages we have been endeavoring to enumerate; and then, with the blessings of health, and the advantages resulting from well-conducted schools, we hope to be able to show to the world that we are not outside Barbarians.

Fruit culture is beginning to receive attention. I was shown an apple tree by Mr. Samuel Graham, of Coosa county, found by him in the woods when small, which he removed to his orchard. Its growth was rapid, being now very large, and not more than six years since he removed it to his orchard; we might almost consider it a native tree. Its deep green foliage made it appear as indigenous as the oak in the wood. The fruit possessed very little acid when growing, even in May, but considerable aroma; it is a fall or winter apple, never having born fruit

until this year. Duncan Brown, esq., of this county, has several apple trees of the same variety, obtained by grafts from Mr. Graham's tree. The fruit should undergo, I think, a chemical analysis. It may possess properties that would be valuable in medical combinations. Nutritive, tonic, and astringent properties may belong to it.

I have written to some length, and will bring this report to a close.

Yours, respectfully,

T. A. BROWN.

To the COMMISSIONER OF PATENTS.

BOLIVAR, JACKSON COUNTY, ALABAMA,
December, 1852.

SIR: Your Agricultural Circular of August, 1852, has come to hand, and in answer thereto I submit the following:

Wheat.—Guano is not used in the production of wheat, nor is it yet *used* or known here, only by name. Wheat, however, is grown to some extent in this part of the State, but nothing can be expected in the way of information to the agricultural community by experiments made in the growing of the wheat crop here, as the production is limited (not enough for home consumption.)

Corn is, and will long continue, the principal crop in this part of the State; and my letter of last year contains all the information that I can give on the subject of cultivating it. This year (1852) has been a good corn year, and corn has eared well. Corn is worth here now only 20 cents per bushel. The manure formed by hogs and from hog-pens, is worth more than I had any knowledge of, until I experimented with it last spring. It will pay well if taken care of and applied to the growing of the Irish potato.

Oats are a good crop, and pay as well as anything committed to the bosom of the earth. I think it a great error in the notion that oats are an exhauster of the soil; my experience is quite the opposite.

Peas are not yet cultivated as a renovating crop; but, doubtless, they soon will be. Peas are a great crop, and no farmer should plant without them.

Clover and grasses are not much grown hereabouts. The experiments are only tolerably satisfactory in the growing of clover. I do not think that red clover is in any way injurious to horses.

Dairy.—Our great distance from market has cut us off from the dairy business so far. But the dawn of better times is now opening, and doubtless some of our best planters will turn their attention to that very profitable branch of rural industry.

Neat Cattle.—The cost of raising a cow until 3 years old is about four dollars, and at that age *now* one is worth *nine* dollars, owing to our chance at the market of the railroad now being constructed in our county.

Horses and Mules.—The growing of these animals is the most profitable business of the farmer—especially mules. They pay well, are always in good demand, easily reared, and soon brought into market; worth, at two years old, from $75 to $100.

Sheep and Wool.—No person has tried the experiment here to any considerable extent. I have no doubt but that wool growing might be made profitable even here, when the time comes, as come it will, that our people will have to divide labor.

Hogs.—We have some experience in raising hogs here. The Berkshire and Grazier, and some other breeds, have been tried, and seemed to do well at first; but, for the want of pasture, and a thorough knowledge of the animal, they have rather declined; and, with our present opportunities for rearing hogs, the common stock does best; or a slight cross may be profitably kept up. In fattening hogs we have no process, only feeding in the ear—the corn hitherto not being an object.

Cotton is raised to some extent this far north; but this is *now* no great cotton county. We count on from six to eight hundred pounds of seed cotton per acre. Any and all crops grow well after cotton. Nothing that we use in this county exceeds cotton-seed as a fertilizer. Guano is not used here at all.

Fruit, sugar, rice, and tobacco are only raised in very inconsiderable quantities. More attention is now being paid to raising fruit.

Potatoes (both Irish and sweet) grow well here. All modes of planting the sweet are practised, and all do well—as for the best way, I cannot say; every one seems to think his way is sufficient for him. The Irish potato has done well this year; every person has the best in the world—all well pleased with the quality and quantity. Cotton seed, yard manure, or fine litter from a wood yard, if well rotted, rotten straw, or leaves, are all good manures to put in with the Irish potato; worth 75 cents per bushel. White London Lady preferable; Long Johnny most prolific, and best for winter use.

Manures.—No very considerable attention has yet been paid to the collecting or using of manures of any description; but some are beginning to look to that quarter now. I am happy to be able to say that I live in the midst of an honest, industrious, intelligent, and enterprising people—all alive to their own interest and the good of society.

We are now within one day, or less, of Nashville, Tennessee; half-a-day of Chattanooga. Corn is now worth 30 cents per bushel and privilege of market. Good times here. This county could sell this year one hundred and fifty thousand bushels of corn, and have enough left for home consumption. This has been, altogether, a good crop year (1852) for everything, and very much desired, for the last two crops were short—very short; but we are now safe—peace and plenty are now our lot.

I remain your obedient, humble servant,

JAMES WILLIAMS.

Hon. THOS. EWBANK,
Commissioner of Patents, Washington D. C.

OAK BOWERY, ALABAMA, *January* 2, 1853.

SIR: I received your Agricultural Circular too late to send my reply by the time desired; and, in addition to such replies as my own observation suggested, I take the liberty of sending an unpublished essay on hill-side ditching.

The system set forth in the enclosed essay has proved itself eminently successful; and as there is great anxiety manifested by the planting community to adopt some safe system, I have presumed to send mine for your consideration, believing that it will be acceptable to most planters.

Yours, respectfully,

JAMES H. FORMAN.

Wheat is subject to disease and disaster—the fly, the smut, and the rust. Here it is not a staple crop, the yield not averaging more than 8 or 9 bushels per acre. It is generally sown after corn or cotton, in November, on the unprepared land, and slightly ploughed in or covered. No grass seed is sown with the wheat, nor is it necessary, as the crop of crab grass is produced in great abundance, and spontaneously; affords an excellent pasture, is well adapted to hay-making or soiling, and is a good fertilizer.

Oats are more extensively raised; they are sown in January or February by a process similar to wheat-sowing, and yield 25 or 30 bushels per acre; but, owing to the great yield, they exhaust the land, which requires a fallow before it will again remunerate the husbandman's labor.

Rye and barley are only sown for early grazing and a supply of seed.

Peas are extensively cultivated by planting or sowing broadcast among corn at its last ploughing. They are an excellent fertilizer, besides furnishing a most exuberant fall and winter pasture.

Horses and Mules.—The rearing of these animals demands, and is receiving, increased attention. The expense of raising a colt to three years old does not exceed $30. Brood mares and colts require good pasturage in summer and fall, and nourishing food in winter and spring; an occasional change of diet, shelter from the cold and rain, kind treatment, and frequent handling, to make and keep them gentle. In teaching a young horse or mule of your own raising to labor, it is not necessary to break him, but first to convince him by kind treatment that you do not intend to injure him. When satisfied of this, he will not be afraid of you. Your voice will soothe him under all circumstances, and he will readily become accustomed to whatever he sees you handle; hence he will take the saddle or harness without fear, and will learn to draw quietly as soon as the muscles of his shoulders become accommodated to the collar. When restiveness is exhibited, it must be overcome by firmness and patience. Never inflict punishment except for viciousness, and never allow a young animal to be so much fatigued as to become disgusted with his labor, or his strength so much overtasked as to discourage him. Thus treated, your colt comes to his work with all the docility of a pet, and with all the spirit of his unbroken nature. He will be safer, more durable, and more valuable every way. Mules are quite as docile as horses when treated with kindness. The best time to commence with them is as soon as they stand upon their feet; but if their early education has been neglected, it will be found much the best plan to tame them thoroughly before attempting to work them.

Sheep are not profitable; very few are kept.

Hogs.—Increased attention is being directed to the rearing and fatten-

ing of these animals; but we are still too far behind our neighbors of Tennessee and Kentucky to make a paragraph interesting on this subject.

Cotton.—The average yield of cotton in this vicinity is about 200 pounds per acre, and cost of production 7 cents per pound. Level land will sustain a succession of cotton crops, while hilly land becomes injured by washing, owing to its shallow and late culture. It is improved by alternating with peas. I have no experience in regard to rust; and the best preventive I am acquainted with for the worms, is winter ploughing, thorough burning of all trash which affords a lodgment for the eggs, and a strictly observed treaty of amity and peace with the little birds.

Our cotton culture is from 3 to 4 inches deep, on a thin stratum of soil, supported by a stiff, arid subsoil of red clay. Deep culture will only do where the soil is rich and abundant in alkali; else the little fertilizing matter will be so diffused through the broken subsoil that the cotton roots will not be able to collect it. Hence we see deep culture without manure produce large stalks, with late and imperfectly matured seed; while shallow culture produces small stalks, with better and earlier developed seed—owing, probably, to the greater concentration of the alkaline matter of the soil, and consequent readier collection and absorption by the roots. We are, therefore, impelled to the conclusion that, however necessary subsoiling may be, it will be advisable on thin soils to attain it gradually—say an inch or two in a season, until the desired depth is reached. I speak of matured seed as being the great desideratum in raising cotton, as every one of the millions of fibres of a boll of cotton is attached to and elaborated by the seed; and we are as certain of a good coat of lint on a perfect seed as we are to see a good coat of hair or wool on a well-conditioned animal.

Rice I have never seen growing on upland, nor do I see the utility of appropriating good corn and cotton land to a production that does as well in mud or under water. Rice, in its rough state, is an excellent alterative for horses.

Root Crops.—Several efforts have been made to introduce the culture of beets, carrots, rutabagas, &c.; but experimenters have generally abandoned them, under the conviction that the sweet potato, besides requiring less culture, is superior in yield and in nutriment, and much more palatable than any root raised here. Each variety has its admirers, and each is best adapted to some peculiar soil. The usual mode of planting is in hills three feet apart each way, with a potato planted or a vine set out in the apex of each. The cultivation consists in keeping them clear of grass and weeds until the vines cover the ground. Yield from 300 to 600 bushels per acre.

Fruit culture is in its infancy; but I am satisfied of the great fattening properties of sweet apples, and also of the fine alterative and renovating effect that peaches and Chickasaw plums exert on the animal system, particularly of swine.

Manures.—Lime, gypsum, and guano are hardly known as manures, and the saving and making of this article is, as yet, a matter of experiment; and results are not known with sufficient certainty to enable me to make a reliable statement as regards the best process, quality, quantity used, &c.

Hill-side Ditching.

Our soils consist of humus, clay, and sand, the clay generally preponderating. Our subsoil is a fine, close clay, which resists the action of water, but when saturated retains it with great tenacity. Humus absorbs water in large quantities, and rapidly; clay, pulverized, in less quantities, and more slowly; sand in still less quantity, but rapidly. Hence, our soils are well adapted to absorb and retain water; and, wherever there is not a sufficiency of clay for the purpose, the subsoil may be made to furnish the necessary quantity.

An ordinary shower gives about half an inch in depth of rain; a hard shower, about one inch; and a hard day's rain, about two inches. The average annual fall of rain is computed at 45 inches. Our soil, well broken and pulverized, will absorb one fourth of its bulk of water. Hence, if we could keep our land thoroughly pulverized to the depth of eight or nine inches, it would seldom wash, always absorbing any but an unusual amount of rain as fast as it falls; but, as this is impracticable, it becomes necessary to adopt some plan by which the unabsorbed water can be conveyed off, so that it shall not settle upon and drown the flats, or collect in such quantities while on its way to the branch as to carry the soil with it.

To prevent this, that system of surface-draining called hill-side ditching has been applied; and, although it has in many instances been condemned as worthless, yet we believe that it is the only practical remedy; and we further believe that the cause of every failure has been attributable either to defective location or construction, or neglected repair. We are confirmed in this belief by observing many applications of the system eminently successful. We therefore recommend that these drains should never be more than 250 or 300 yards long without an outlet; and also to increase their capacity, either in dimensions or grade, to accommodate the accumulation of water. Where the subsoil is firm and tenacious, we recommend the latter, and submit a formula, viz: Let the first fifty yards of your ditch (counting from the summit) have a grade of one-fourth inch to the yard; the second fifty yards, one-half; and so on, increasing the grade one-fourth of an inch every fifty yards. In constructing the ditch thus located, the subsoil should be excavated three or four inches. This gives a channel for the escape of ordinary showers without wearing away the embankments, and also furnishes material for strengthening said embankments; but where the subsoil is light and porous, the increase of capacity must be in width. In adhesive soils the ditches may be sixty or seventy yards apart; but in light soils, not more than forty or fifty.

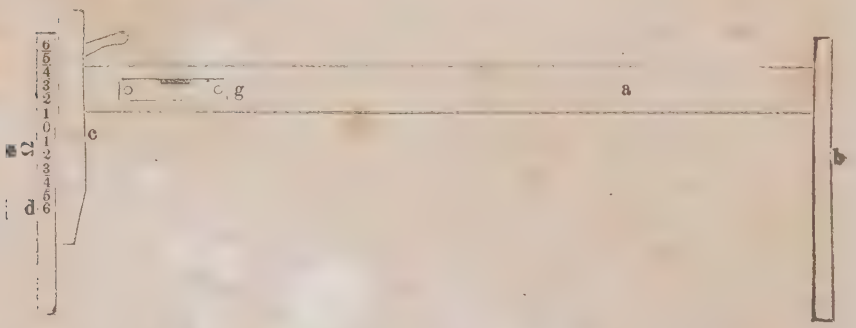
In locating, use the spirit-level, as it is obvious that a defect in this operation is incurable. For the description and manner of using a convenient and cheap instrument of this sort, we refer you to the drawing.

The inequalities of surface incidental to cultivated land will exhibit a great many abrupt turns in your location; and moving it a little, either up or down, always remembering not to move more than two contiguous stakes to the same side, and to strengthen the embankment where it is moved down, or to deepen the ditch where it is moved up—by these means the general grade is preserved; and these short turns, that are so objectionable, by projecting the water against the embankment and

wearing it away, and by affording lodgments to the floating trash, and by the difficulty of adjusting your rows to them, are all obviated, while it gives the work a much more graceful and regular appearance. Another fruitful source of failure in this system is suffered by laying of the rows so that they cross or abut against the embankments, thereby causing them to be trodden down by the horse in ploughing. This may be, and ought to be, obviated by laying off the first row in each space of land close to, and parallel with, the embankments, and every succeeding one parallel to it, until your space to the next ditch below is all laid off. By this arrangement, the horse, in ploughing, will never be required to step on or over the embankment, and your rows will be as well, if not better, situated to facilitate the process of cultivation and draining than by any other means.

We are confident, from observation and experience, that the plan here indicated, if properly executed, will succeed with a very little attention, after construction, as the ditches will keep themselves clean. It will only be necessary to clear them of such rocks, limbs, or large trash, as cannot float off. We are also satisfied, from experience, that the alluvium deposited by these ditches is an effectual reclaimer of our barren glades, and by directing them to such points, the land thus reclaimed will more than compensate for that occupied by the ditches.

An expeditious way to make these drains is to open your way with a turning plough, and follow with coulters; and again with a turning plough; and then clear out with hoes.



The above sketch represents an instrument used for locating hill-side ditches

a is a lath, one inch by four, and twelve feet long.

b is the hinder leg, one and a half or two inches square, three feet long, and securely fastened to the lath.

c is the fore leg, one and a half or two inches square, two and a half feet long, and securely fastened to the opposite end of the lath.

d is the sliding leg, one and a half or two inches square, and three feet long; it is graduated and numbered from zero, six inches up and down, and by means of a slit and the thumb-screw.

e may be moved and secured to any required grade, there being a mark on the fore leg that coincides with the zero mark on the sliding leg, when the instrument is adjusted to a level.

f is a handle, to carry and hold the instrument by.
g is a small spirit level, securely fastened to the lath by two screws.

In using the instrument let the operator provide himself with a number of small stakes, eight or ten inches long, and an assistant (a small boy will do) to carry the hinder end. Then let him determine his starting point and put down a stake, directing his assistant to place the hinder leg against it; then let him determine the grade he wishes to run, and whether up or down, and adjust the instrument accordingly; then move the fore leg to the right or left until the bubble indicates a level, and put down another stake against the foot of the sliding leg, and proceed as before, directing his assistant to place the hinder foot in the precise spot occupied by the fore one. It will be seen that the instrument can be adjusted to any change of grade that may be required, in a few seconds.

JAMES H. FORMAN.

CHUNENUGGEE, ALA., *January* 17, 1853.

SIR: I had the honor some weeks since to receive from the United States Patent Office the Annual Agricultural Circular, to which I should have done myself the pleasure of responding at an earlier period but for ill health, and circumstances quite beyond my control. I shall not attempt an elaborate reply to each interrogatory contained in the Circular, supposing the information sought in relation to the husbandry and agriculture of the country should be confined to the locality where certain articles are grown, and then practical, reliable information may be obtained. Were I to discourse about hemp, sugar, and tobacco culture, it would all be theoretical, for I live in a famous cotton region, where that great staple is more certain, and subject to fewer casualties, than in any portion of the Union with which I am acquainted, for there has been no failure, and my neighbors have made good average crops uniformly for the last fifteen years. Hence, cotton is the all-absorbing idea; but little attention is paid to anything else; consequently, we are the most dependent people in the whole Union, although nature has scattered her bounties and blessings with a more lavish hand here than upon any portion of the habitable globe. Could we subsist on cotton, could it be metamorphosed into an article of diet, then would we be the most independent people in all Christendom. But not being able to do either, how unwise, how absurd, is our system of agriculture? In a country where the Cereals attain the greatest perfection, with the most prolific soil, yielding in its natural state, viz: without any fertilizer, from 40 to 60 bushels of corn, from 15 to 20 bushels of wheat, and from 30 to 50 bushels of oats—yet with these great advantages for stock-raising, nine tenths of our planters depend alone on the West for their meat, mules, and horses, and even their flour. "No State in the Union possesses, in a greater degree, materials for a proud independence than does Alabama. These materials, however, are yet in a crude state, and nothing but a strong decoction of Northern fanaticism will ever bring to light their wealth and beauties."

We should have learned, long ere this, that depending on the North and West for our supplies, tends more and more to impoverish us and

increase our vassalage, destroying all rivalry or competition. The great desideratum with the cotton-planter should be the power to manufacture, to some extent, with the force that makes it a portion of his cotton crop. Were the spinning machinery a little more simplified, so as to be propelled or carried by horse-power, and enable the planter during the winter and spring to convert the raw material into coarse No. 4 yarns, he would then realize from 16 to 18 cents for his cotton, instead of from 6 to 9. Each hand upon a good cotton plantation would clean from six to eight hundred dollars, thereby rendering a cotton plantation of far greater value than the richest placer or gold mine of California or Australia. That such will be the result, I entertain not the smallest doubt; and when accomplished, Alabama will be the most brilliant star in the galaxy of States, without entering into competition with Pennsylvania in the coal and iron trade, with which her mountains abound.

These calculations may seem extravagant to those who have not investigated the subject. I feel assured the estimate is low. A friend of mine, largely interested in manufacturing as well as planting, informed me his cotton yielded him a net profit of from 15 to 16 cents, when the raw material was worth only 7 or 8 cents. Now is it not apparent, where a hand make eight bales of cotton, (and they frequently make ten,) that at 15 cents, his labor would be worth $600? At the hazard of being thought egotistical, I will venture to allude to my agricultural operations, with which I have great cause to be satisfied, believing that but few farms, for the last ten years, have been more profitable than mine. I farm as well as plant; while my neighbors plant two-thirds of their best land in cotton, I appropriate more than two-thirds of mine to the Cereals and vegetables, raising large crops of potatoes, peas, turnips, &c. Besides raising my own meat, I usually break a fine team of mules every spring, from mares that aid in ploughing the crop; and from the sale of surplus grain, the expenses of the farm are well nigh defrayed, leaving the cotton crop clear for other investments. Though so large a grain-grower, cultivating between seven and eight hundred acres in corn, and between three and four hundred in small grain, yet I have uniformly made more cotton than we could gather before February. By this system I have been a large stock-raiser; my people have lived comfortably, not being greatly exposed; have been very prolific, which is no small item on a farm where there is an increase of ten or a dozen annually.

But to the Circular. *Wheat*, in this portion of South Alabama, is regarded as rather an uncertain crop, subject to many disasters—such as rust, black blast, &c., &c.: consequently, it is not grown to any great extent. Judicious planters raise enough for home consumption. By sowing the forward kind about the middle of October, there would rarely be a failure, as the crop generally matures before the heavy rains of the latter part of May and first of June, which induce rust, blast, &c. I know of no experiments with guano in that way; it has been used very successfully by our horticulturists.

Corn.—I only know one planter who has used guano in connexion with the corn crop. The result of his experiment I have not learned. The principal manure used by our planters is cotton-seed, with a good supply of which our thinnest land may be made to yield a fair crop of corn. In a proper state of decomposition, cotton-seed exerts a wonderful influence, not only on the growth of corn and cotton, to which it is usually applied, but as a general fertilizer. The most skilful corn planters

are governed in their mode of planting by surrounding circumstances—the quality of the soil, the manner in which it lies, whether flat or rolling. Upon exhausted lands, or where the soil is thin, planting in hills at four feet distance, leaving only one stalk, is the surest mode, and, if well cultivated, seldom fails to yield an average crop; but on our slough lands and creek bottoms, bedding with the turn, ploughing and drilling the corn upon a high bed, leaving the rows from five to five and a half feet wide, and leaving the stalks from twelve to fifteen inches apart in the drill. Corn planted in this way on our black-lime lands, with good cultivation, ordinary season, will yield from forty to sixty bushels.

Oats, Rye, Peas, and Beans.—Oats, with us, are becoming a very important crop; nothing is surer, and our lime lands yield them in great abundance, supplying in a great degree the place of corn, of which our farmers are generally scarce, always straitened in the latter part of summer, appropriating, as they do, all their best land to the growth of the long staple; indeed, they only plant with the view of making a scant supply, and, if they run short, and the river keeps up, they can get a few sacks from New Orleans, and, although heated and sour, they will try to make out with it. The horses can do upon oats, and the negroes upon potatoes and peas—a fine system of rural economy, but such is the husbandry of South Alabama.

Rye.—Our climate is less adapted to the successful culture of rye than any of the Cereals. It is only cultivated for grazing purposes, and is valuable as a green pasture for stock during winter, especially for milch cows, sheep, colts, &c.

Peas are cultivated by most of our planters. They renovate the soil and fatten the stock, and would be of great value but for their mysterious *modus operandi, occasionally*, of killing all the hogs and cows upon the farm, as has occurred with my neighbor, Captain Arnold Seale, the past and present season. I say mysterious, for I have been in the habit of raising peas and fattening my stock upon them with perfect impunity for the last twenty years, and I am not aware of ever having lost a pig or yearling by their use. *Beans* are only planted for table use, being a fine, wholesome vegetable.

Clover and Grasses.—But little attention has been paid to exotic or foreign grasses. Our summers are too long and hot, it is supposed, though I have at this time a small patch of the red clover growing on my prairie plantation that looks flourishing and fine; and it shall have a fair trial. Our native, or spontaneous grasses, with proper care and attention, would prove an invaluable treasure. The experiments of Major Seymour Powell fully demonstrate the correctness of this impression, and prove most conclusively that the crop of crab-grass grown on a prairie field after the corn is laid by, if well saved, would be worth more than the corn. To test the matter, he measured several acres. Off the first acre he gathered thirty bushels of corn, which, at the market price, 75 cents, brought $22 50. Off the same acre he saved 2,675 pounds nice hay, worth from $1 to $1 25 per cwt.—say $26 75. The second acre yielded 3,780 pounds hay, worth $37 80, and —— bushels of corn, worth $28 40.

Foreign or imported hay is now selling in Montgomery and Mobile at $1 25, and our citizens are paying thousands of dollars annually for

hay inferior to that growing spontaneously over all our fields. Things far-fetched and dear-bought *only* suit the South.

Dairy Husbandry.—But little attention paid to that. Some few improved breeds have been brought to the country, but have not received sufficient attention. But few make butter for market, and many buy Goshen butter.

Horses and Mules.—Very few attempt to raise horses or mules here. They look to the West, and from the West they get them, or do without.

Sheep and Wool.—Very little attention is paid to sheep-raising. Had we a market for the wool, and the canine race destroyed, sheep-raising would be a profitable business—they do well in this climate.

Cotton.—So much has been said and written upon the subject of cotton that I fear it would be a work of supererogation for me to enter into details in relation to its mode of cultivation. I am sensible of the fact that the seasons have more to do with the crop than any system of culture. I have never failed to make a fine crop when the summer was dry. The average crop in the lime lands is about one thousand pounds, though as much as two thousand, and even two thousand five hundred pounds, are frequently gathered off an acre of hammock or slough land. I will not trespass further upon your time, and only regret that I am not able to make a better report of our stewardship as agriculturists in a country so highly favored by a kind and beneficent Providence.

Respectfully, your obedient servant,

N. B. POWELL.

CLARKSVILLE, HABERSHAM COUNTY, GEORGIA,
November 20, 1852.

DEAR SIR: Below I have endeavored to answer your Circular of interrogatories in as condensed and correct a manner as the nature of the inquiries will permit, although there must be some allowance made for differences of the opinions of different individuals with whom I have conversed upon the subjects embraced; and with the view of giving the most reliable and correct information, I have taken the average opinions upon the questions propounded, and have little doubt as to their general accuracy.

Wheat.—No guano has ever been used for any purpose in this county. The average product per acre is not more than eight bushels, although, with proper cultivation, over twenty bushels per acre have been raised. The seed is usually prepared by soaking it twenty-four hours in a solution of sulphate of copper, (blue-stone,) as a preventive for smut, and with the most perfect success. About one bushel of seed per acre is the usual quantity sown. The usual method is to sow upon land which has been cultivated in corn, and plough it in with a one-horse turning-plough, all which is done in a very slovenly and imperfect manner. The yield, I think, is increasing, as occasionally some one individual prepares his ground as it should be, and is rewarded well for his labor in a good yield, which has its influence upon his neighbors. The best preventive for the ravages of the Hessian fly is to kill all the grass before sowing by early and good ploughing, and also not to locate the field

intended to be sown alongside or contiguous to a grass field. Best and absolute remedy for weevil is to expose the grain, after being threshed, two or three days to the sun by spreading it on a scaffold prepared for the purpose. Average price 87½ cents per bushel.

Corn.—The average product per acre in this county does not exceed twenty bushels, although there are some lands which produce from eighty to one hundred bushels. Major Edward Williams, of Naucoochee valley, in this county, has succeeded, by judiciously manuring a field of twenty-five acres, twice in raising it from twenty bushels per acre to eighty-one bushels, which was the largest yield of upland corn exhibited at our State fair for the year 1852. The cost of production is probably about twenty cents per bushel. The best system of culture is to manure well, during the winter, the land intended to be planted, and to deposit the manure in small heaps upon it and cover them with earth until the time of ploughing arrives; cultivate by ploughing once, and afterwards pass through from time to time with a cultivator, to kill the young grass and weeds.

The best method of feeding is to have the grain both ground and cooked. I should suppose the manure from ten bushels corn, fed to hogs, and properly applied to the land, would, before being expended, add ten bushels to the crops raised upon the ground to which it was applied, over and above what it would have produced without it. The ground is generally prepared by ploughing once with a one-horse plough; but our farmers are beginning to plough deeper than formerly, and some of them to subsoil plough with great advantage. The usual distance between the rows is from four and a half to five feet, and two feet in the drill.

Oats.—Average yield per acre, probably about thirty bushels; quantity of seed sown per acre, one bushel; considered an exhausting crop.

Barley.—None raised.

Rye.—Average yield per acre, about ten bushels; quantity of seed used, about one bushel per acre; not considered an exhausting crop.

Peas are cultivated as a renovating crop by some, and with very evident beneficial results. It may be called, as a renovator, the clover of the South, as it serves the same purpose here that clover does at the North, both for hay and manure.

Dairy Husbandry.—Very little attention paid to the business as regards the improvement of cattle, or the making of butter or cheese; cost of raising cattle to the age of three years, probably about four dollars per head. The usual price at that age is about ten dollars per head. Our cattle are generally turned into the mountain range in April, where they remain and provide for themselves until the 1st of December. I am unable to give any information as regards blooded cattle from personal experience.

Horses and Mules.—The raising of mules would, beyond doubt, prove very profitable, as they can be raised in the mountains as easily as cattle, and with as little care and cost as regards feeding. Mules and young horses are usually broken to labor by harnessing them by the side of a gentle old horse or mule for a day or two, when, with gentle and careful treatment, they will work kindly afterwards.

Wool-growing.—A number of gentlemen in this county are commencing the raising of fine-woolled sheep with a fair prospect of its proving

profitable. I am unable to give the cost of producing it—necessarily must be very little as regards current expenses. It costs no more, and probably less, to produce fine than coarse wool, as the French Merino is hardier than the native. I have heard it said that 100 ewes would raise 99 lambs in a year; or, in other words, they scarcely ever lose one. The country is admirably adapted to the raising of sheep, as the climate is very uniform in temperature.

Hogs.—Very little attention paid to raising and improving the breeds of hogs. A mixture of the Grazier and Berkshires is supposed to be the favorite cross.

Cotton.—None raised.

Sugar Cane.—None raised.

Rice.—It can, I am informed, be successfully grown upon upland and yields, with fair attention, 50 bushels per acre. I cannot give any information in regard to the best methods of cultivation.

Tobacco.—This county is admirably adapted, in the character of soil, to the production of tobacco, which is on the increase; almost every variety grows well, and yields a fair remuneration to the cultivator. There is nothing new or interesting practised in its production, and probably it is best to alternate the crop with that of wheat or other small grain.

Potatoes.—Both Irish and sweet potatoes succeed well in the lands here. A fair crop of the former is about one hundred and fifty bushels per acre; and of the latter, from one hundred to three hundred bushels; cost of production, about ten cents per bushel. There is but little of the rot known here.

Fruit Culture.—The cultivation of fruit is receiving much attention at this time; more attention is being paid to it throughout the State than there is in any other; the varieties of seedling apples and peaches are very numerous and fine. At the last exhibition of our State fair some sixty varieties of native apples were presented, and amongst the number many desirable kinds were found. A committee of three competent gentlemen were appointed by the executive committee of the Southern Central Agricultural Society, to clasify, name, and reject, those of an indifferent character, and recommend those found worthy of a more extended cultivation. From the character of those presented, I do not hesitate in saying that, in the space of ten or fifteen years, the trade in apples will be from Georgia to the Northern States, instead of as at present, from the North to the South. Apples grow larger and fairer here than in New York State, and a decided preference is given to Southern seedlings, many desirable kinds of which have originated with the Cherokee Indians in this and the adjoining States, and who were acquainted with no other means of propagation than by planting the seeds. Northern varieties of apples grow as well here as at the North, but generally ripen too early for preserving or transportation to market.

The justly vaunted Early Harvest, Newtown Pippin, and Esopus Spitzenberg, will not compare for size, flavor, and beauty combined, with our Julien Summerour and Cullasaja. The committee above alluded to expect to extend their examinations another season to that of peaches and other fruits, as well as to that of apples, to which it was necessarily confined this season. Pears grow admirably here, and are becoming more and more extended each year. I have practised cutting away the diseased portions of the bark in case of attack of blight, (as it is easily

discovered on the trunk and larger limbs previous to its affecting the foliage,) and then applying a mixture of common lye, or soft soap, and an equal part, by measure, of spirits of turpentine. This mixture I apply with a painter's brush to the entire trunk and larger limbs, and in every instance of attack previous to its use the trees have recovered from it, and those which had not been attacked by it have thus far escaped. Those grafted upon quince stocks appear most liable to the disease, and the quince tree itself here usually dies with it in from eight to twelve years, and frequently sooner. *Query.* Have we not poisoned the almost entire race of pears by working them upon quince stocks, and then, by grafting from them again upon pear stocks, communicated it to them? This disease appears almost to be a constitutional one with the quince, and if, upon experiment, it be found so, it had best be abandoned as a stock for grafting pears upon. The yellows is a disease peach trees are not subject to here, but, instead, we are annoyed with the depredations of the curculio, for which no effectual remedy has been found. Neither are our apple trees subject to the blight, as is said to be the case in the Northern States.

Grapes grow kindly here; many of the foreign varieties do very well yet, although they have not been cultivated many years, nor to any extent. The kinds most generally grown are the Scuppernong, Isabella, and the Warren, Segar Box, or Miller, of N. C., which, I am informed, are identical and indigenous in Georgia. The Catawba also succeeds well, in addition to those mentioned, and is a desirable variety here for general cultivation. The finer cherries, when grafted upon the Mazzard stock, do not succeed, as the bark of the trunk invariably splits, causing its death in a few years after transplanting.

The growing of fruit will, beyond question, prove profitable to Southern planters and farmers, and I have scarce a doubt that the apple can be grown, by proper care and culture, in every portion of the State.

Yours, respectfully,

J. VAN BUREN.

NEAR BLAKELY, GEORGIA,
November 2, 1852.

SIR: In reply to the inquiries contained in your Circular, a brief statement will give the requisite views of the agricultural operations of this county—indeed, of most or all of Southwestern Georgia.

Indian corn and the *cotton plant* are grown on a large part of almost every plantation. Next to these, the oat crop is the most important; but wheat, rye, and barley grow well, and are produced as crops of secondary value, on which very little care or skilful husbandry is bestowed. Excellent crops—such as sweet and Irish potatoes, cabbages, beets, and most other productions of kitchen gardens—are grown in requisite abundance for domestic use; as also, rice, sugar-cane, and ground-nuts, most of which are consumed on the plantation.

Indian corn—very large fields of which are cultivated for the subsistence of horses, mules, and hogs, as well as for bread—is produced in

quantities per acre varying from ten bushels to forty; fifteen or eighteen may be assumed as the average for the county.

Cotton is by far the most important crop we have, and yields, per acre, from two hundred to five hundred pounds of marketable wool, according to soil, season, and tillage. Though seldom or never a total failure, this production is greatly curtailed by wet weather during the season of fructification—say from the middle of July to the middle of September. It is asserted by many observant cotton-planters, that, if from falling rains the inside of the bloom or blossom once becomes thoroughly wet, the fruit is inevitably blasted, and doubtless long spells of rainy weather at that warm season favor the generation of worms, which destroy the young bolls—sometimes to the extent of fifty per cent., or more. We have even remarked that dry summers are highly favorable to heavy cotton crops and the good health of the inhabitants. The customary pitch of crops in this county is about twelve acres in cotton and eight in Indian corn for each able-bodied hand or laborer, white or black; besides this, however, two or three acres to the hand in oats or other winter grain, and half an acre or more in sweet potatoes, with garden productions for family use.

The customary allowance of food to negroes, in bacon or meat of equal value, is three pounds and a half weekly, and as much corn-meal as may be needed, (about a peck,) with unstinted access to the turnip patch, and the fields in which pumpkins and peas or beans are grown. Each family of negroes is also permitted to cultivate for its own use a sufficient garden spot, and to raise chickens. These provisions, so far as my acquaintance extends, are common; but some masters of slaves allow more, and some ess. The sweet potato crop is a valuable one, and might, beneficially to the country, be much extended, as this choice esculent can be kept in good condition from one harvest to another, though it is generally eaten up by or before midsummer.

What we call the corn-field pea—of which several varieties are abundantly grown in all our corn-fields, especially on fresh lands—seems to keep our live stock of all kinds fat, during the fall and part of winter. It is for the most part eaten off the ground on which it is grown, none being gathered except for seed, and a few bushels for table use.

Some cotton planters do not raise meat for their own consumption, but buy it of those who have it for sale, chiefly the dealers in pork and bacon at New Orleans and other seaboard markets. They are, of course, able to cultivate much larger crops of cotton; but the usage in this county generally is to make plenty of provisions and less cotton—a course of farming that is probably more economical, at all events attended with less trouble and risk, and I doubt not secures the better feeding of both men and beasts.

So many acres of cotton, corn, oats, and other crops could not be cultivated without an extraordinary use of the plough; so in fact it will be found that no country on earth keeps and feeds so many plough-beasts, horses and mules, as the cotton-growing regions of the South. They are a costly part of our plantation stock, and were it not practicable to raise sufficient forage on the place, and as much cotton as may be housed by Christmas, our system of agriculture could not be sustained; at any rate, the profits would greatly decline.

Thousands of mules are driven from the valley of the Mississippi, and

sold in this and other cotton-producing States. Western mules are chiefly relied on; of late, however, our planters seem determined to diminish this reliance, by raising these animals on the plantation where they are intended to work.

Very respectfully, &c.,

E. CRAWFORD.

To the COMMISSIONER OF PATENTS.

WACCAMAW BEACH, NEAR GEORGETOWN, S. C.,
November 8, 1852.

SIR: In replying to your queries respecting rice this year, I will begin by stating the results of the trade in that staple, showing the amount of the crop of last year. I extract from a commercial journal of the city of Charleston, September 1, 1852:

The exports of rice from September 1, 1851, to August 31, 1852, were one hundred and twenty-six thousand seven hundred and seventy-seven tierces.* Of this crop were exported—

	Tierces.	
To Great Britain, about 67 per cent. in paddy	12,889	
France..... about 26.... do....do.....	4,299	
N. of Europe, about 36.... do....do.....	27,295	
West Indies.....	20,770	
Total foreign exports.....		62,253
To Boston....about 9 per cent. in paddy.....	4,101	
New York, about 6 .....do....do	31,506	
Rhode Island	20	
Philadelphia	5,041	
Baltimore	3,563	
New Orleans and Mobile.....	17,274	
Other ports.....	19	
Total coastwise exports.....		61,524
Grand total exports		126,777

In addition to this amount of rice exported we have the quantity consumed in the city and the accidental losses to be considered, also; which will make the total consumption and exportation, between the periods

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* City consumption.....12,000 tierces .....126,777 Exports
Less stock on hand September 1, 1851....1,474
..... 10,526
Burned 30—and stock on hand September 1, 1852—164 194
Rice crop of 1851-'52..... .....137,497 tierces.

already designated, one hundred and thirty-eight thousand eight hundred and seven tierces, thus:

	Tierces.	
Total exports	126,777	
Consumption of city of Charleston	12,000	
Burnt	30	
Total consumption		138,807
Taking the supply for the same period, we have received—		
Clean rice	115,469	
Rough rice, paddy, (462,590 bushels)	22,028	
Total receipts	137,497	
Stock on hand September 1, 1851	1,474	
Total supply		138,971
Leaving a stock on hand September 1, 1852		164

By these statistics it will be seen that the entire crop of the last year, as denoted by the receipts, was one hundred and thirty-seven thousand four hundred and ninety-seven tierces, while the total consumption was one hundred and thirty-eight thousand eight hundred and seven tierces, or exceeding the receipts by one thousand three hundred and ten tierces, which was supplied from stock on hand September 1, 1851.

This year (1852) the weather was favorable to the growth of rice until the latter part of August, as will be seen somewhat from the following statement, showing the number of wet days, and the quantity of rain which fell:

	Inches.
In January, there were 5 days of rain	1.42
In February....do....10....do	2.08
In March.....do.... 8....do	4.04
In April .....do.... 9....do	3.81
In May.....do.... 7....do	3.64
In June .....do....10....do	6.03
In July.....do....17....do	8.01
In August .....do....15....do	3.20
In September...do....11....do	12.48
In October.....do.... 7....do	5.16

On the 11th and 12th September 6.14 inches of rain fell. Snow and sleet fell in January and March.

In the earlier part of August the coast was visited by a severe storm of very general extent, accompanied by unusually heavy rains, in the interior of Carolina. The consequence was a destructive freshet in all the rivers in the State. The growing crop of rice, then nearly ready for the sickle, was submerged in many places on the Savannah, the Santee, the Wee Nee, and the Pee Dee. Nearly all the planters, not thus overflowed, were delayed in their harvest by a long continuance of east winds backing up the river-water, and producing a succession of

high tides. The harvest in this neighborhood, which ought to have been commenced on the 9th to 12th, was not fairly begun until the middle of September, and then under many disadvantages. The season was so wet that much of the rice was imperfectly cured. The rice was over-ripe when eventually reaped, and wasted very much in the handling. Another storm, on the 9th October, overtook the harvest, still unfinished, and added, of course, by its effects, to the damage previously sustained by the crop.

From the foregoing statement I infer that the crop of rice, though it may not be inferior, in the number of bushels, to that of an ordinary season, yet in the number of barrels of clean rice for export, it will be less. We may suppose that very prime parcels will be the more highly estimated, owing to the scarcity of such.

In respect to improvements, I am inclined to think that the draining of rice-fields might be improved, and the harvest somewhat facilitated, if we could be furnished with a flood-gate of the nature and for the uses of a tide-lock, but not so expensive. Rice-flour is believed to be the best manure which has been used thus far, stronger and more diffusible than either chaff or rice-straw, though more costly.

The cheapest of all manures, however, is the sediment deposited upon the fields themselves by our great rivers in their occasional overflow. A remarkable instance of this deposit occurred on North Santee, in the year 1845, I think. I examined the crust of deposit on Mr. Andrew Johnstone's plantation the year after, of which I preserved a specimen, over two inches in thickness. I caused to be sown in April last a small sample each of four varieties (the best of near twenty, which were furnished me by Mr. Lawton, the active president of the South Carolina Institute) of foreign rice, the product of which I have not yet examined. The opinion of my overseer is that they are all inferior to our own seed.

I am, very respectfully,

ROBT. F. W. ALLSTON.

To the COMMISSIONER OF PATENTS.

LAURENSVILLE, SOUTH CAROLINA,
September 27, 1852.

SIR: In reply to your inquiries on points belonging to "rural affairs," I take pleasure in answering as follows:

Wheat.—Guano has not been used in the production of this crop, within my knowledge. The average product per acre, from seven to ten bushels. November the time for seeding, and June the time for harvesting. Soak the seed in blue-stone solution—about one pound for every five bushels, which is almost universally regarded as an effectual remedy for smut; about three pecks to one bushel of seed per acre. Plough, generally, only once; the yield increasing. Wheat after cotton; corn after wheat; sow early—best remedy for Hessian flies. Sun well, and put up while hot, to prevent the injury by the weevil. Average price in 1852, $1 25. No grass-seed sown with wheat.

Corn.—Guano is not used, within my knowledge, in the production of this crop. Average crop, about fifteen bushels per acre. Best system. Plant in drill rows 4½ feet apart, and 18 inches in drill. Plough four times—first and second times deep, last two shallow; the ground to be subsoiled nine or ten inches deep before planting. Ground food is best, and given cooked.

Oats, Barley, Rye, Peas, and Beans.—The first yields about thirty bushels per acre; the second, about sixty; the third, about five or ten; the fourth and fifth may be made to yield from forty to fifty if planted alone, but not the half of that if planted as is usually done, with corn. The first takes, per acre in seed, about 1¼ bushel; the second, about the same; the third, about 3 pecks; the fourth and fifth, if planted with corn, about 10 bushels for 100 acres. Peas and beans least exhausting; oats most. Peas are regarded as the clover of the South as a renovator.

Clover and Grasses.—No experience with clover or grasses except for small grazing lots.

Dairy Husbandry.—Make none for market, except for village consumption. No cheese; butter now 15 cents per pound—usually 12½.

Neat Cattle.—Usual price, 4 cents per pound; grass-fed dairy cows worth from $10 to $20.

Horses and Mules.—The growing profitable when there is good pasturage.

Sheep and Wool.—No experience, only for home consumption. Farmers do not generally succeed well with them here.

Hogs.—The tall English, mixed with Berkshire or Woburn. To cure hams, salt down the pork about two weeks; take up and resalt with one teaspoonful of saltpetre to every ham, and three pounds of brown-sugar for every 100 pounds of hams; pack down for two weeks more; then take up, wash the hams in warm water, and put them in clean sacks of coarse white cloth; stop the meshes with a solution of lime or hickory ashes; then hang and smoke for three or four weeks, letting them hang all the balance of the season until wanted for the table.

Cotton.—Average yield of cotton in the seed, per acre, about 600 pounds. Cotton after wheat. Know of no preventive against rust, army, or boll-worm; seldom annoyed by any in this part of the country. A low bed or ridge is the universal preparation for cotton; the after-culture not very deep. The seed is one of the best fertilizers for any and everything grown in the earth. The cotton lands may be improved by seeding once in two or three years and ploughing horizontally; and, if the land is hilly, hill-side ditches are indispensable. I have no experience with guano.

Sugar cane.—None.

Rice seldom grown; a few grow the upland rice for home consumption.

Tobacco.—None.

Hemp.—None.

Root crops not grown as a field crop.

Potatoes not grown, except for table use.

Fruit culture receiving increased attention. Now that railroads are affording greater facilities for transportation, apples might be profitably grown. Sweet-potatoes are better than apples by far for hogs and cattle. None will keep well here during the winter. I know of no remedy for *blight* in trees. From experience, they propagate fruit trees by the cleft-graft in February and by budding in June.

Manures.—Our common plan is to collect forest leaves into the barn yard, and, after being trod for a few weeks, put up in pens and litter again. Neither lime nor plaster is much used, though both are thought to be good fertilizers.

With my best wishes for the laudable object designed by the questions propounded, the above, though ever so imperfect, is respectfully submitted.

Respectfully,

JOHN W. SIMPSON.

P. S.—Many of the citizens of our district have recently organized themselves into an agricultural society, of which I have the honor of being president. In their behalf, therefore, I would be pleased to receive a part of the many seeds, &c., which are deposited in the Patent Office for distribution.

J. W. S.

LAKE SWAMP, HORRY DISTRICT, S. C.,
June 22, 1852.

SIR: On the 15th of November, 1851, I received your kind favor of a half pint of Troy wheat. On the 19th I planted it on ground measuring 36 by 30 feet in drills two feet apart. It stood the freeze of winter remarkably well, which was one of the coldest we have had for many years. The 19th March last we had a very heavy snow. The wheat had commenced jointing; the snow injured it very perceptibly. On the 15th of June I harvested it, and the yield was one hundred and four fold—that is, 26 quarts—being 104 times the amount of seed planted. Had it not been for the injury by the snow, which caused the bottom blades to die, and a very dry spring, I think the yield would have been one-third more. I am well pleased with it, and purpose giving a fair trial this fall. Most of the straw grew five and a half feet high, and I have heads of it saved from five to six and a fourth inches long. Permit me to return you my warmest thanks for the two Patent Office Reports you sent me. I view them as a great blessing to the farmer.

Very respectfully, yours,

THOS. A. BEATY.

GREENVILLE COURT HOUSE, S. C.,
September 29, 1852.

SIR: In reply to your Circular, which I received a few days since, I will endeavor to give you my experience in the raising of clover, that other planters in the South may be encouraged to try effectually the culture of some of those grasses that flourish so well here, and particularly that of clover, which I find to be one of the very best crops used in agricultural economy—one that grows luxuriantly, and comes in at the scarcest season of the year. It affords more nourishment than any other hay crop I have ever tried. All kinds of stock are particularly fond of it. I know that some planters in the South have been discouraged entirely from growing clover, thinking that it will not grow in this latitude,

35° 10′ N.; but I have seen beautiful crops south of this; and perhaps the experience of one who has grown it successfully for twenty years may be an encouragement to others.

I commenced with clover in 1832; the seed I think was old. It was sown the first day of April, (rather late for this climate,) on rich alluvial bottom land, without manure or lime. I put only one gallon of seed per acre.* Oats were first sown—a light crop—and ploughed in close; the clover-seed was then sown and brushed in smooth. The spring was dry, and the clover-seed did not come up until about eleven months afterward—being the first of March the next year. I waited, however, with great patience, and kept off all kinds of stock, and in the winter had the weeds and stubble taken off, that I could have the clover cut close to the earth; and by the 24th of May it was from two to three feet high, and yielded more than three tons of hay per acre the first cutting; and two crops in the year are common, though the second is not so good for horses, although it is fine for cattle if well saved. The proper time for cutting it is when in full bloom, by which time the oldest blossoms will turn black. To secure the full benefit from this hay, it must be cut when the clover is dry; and, after laying two or three hours in the sun, it is then in the best state for feeding. But when it is necessary to take off the entire crop in a few days, turn the hay over the third hour after cutting; this prevents the leaves from falling off. Cock it up before the dew falls on it. The next day, with one hour's airing, it will keep in an open loft, spread thin; but if it heats in the bulk, after the first night, it will sour and "funk;" then it is not so good for food, as in this state it often salivates a horse. If it is too old or wet when it is cut, stock are not so fond of it; but the great avidity with which they devour it when properly cured fully compensates for all the care necessary to be taken; and therefore we must always keep it sweet; for when sour it will salivate a horse or mule severely: and this is one reason that persons have supposed that it was injurious to horses. And one other way it will injure horses, as will any other hay or corn blades, is this: when it heats in curing, by being bulked too soon, it gets mouldy and dusty, and if fed to a horse in this state, it will produce a cough, and finally bellows, or phthisic, as some farriers call it; but in no other way does it injure any stock. It matures at a season when work animals need such food more than at any other, and seems to be exactly suited to their wants, and is a great saving of grain.

I find in this climate that clover does better sown in the fall with wheat or rye, in the same way it is sown with oats in the spring. If the land has produced a crop of peas before sowing it is better. Land that contains a good portion of lime is best for clover, and on land that is deficient in lime the clover crop may be very much improved by applying fine slacked lime, at the rate of ten bushels per acre, when the clover is about five inches high. It is best to apply it as regular as possible; and to do this I have taken a carryall, laden with ten bushels of lime, on the land that was staked off into squares of one acre, and then with a wire sieve, shaken the lime through it on the land, taking a swarth four feet wide across the acre. It is best to do this in damp weather when the mist is falling in the spring; then the lime is carried down regularly

* Five quarts of seed are better.

on the land. If you apply lime to wheat in this way in the spring, it will produce a most luxuriant growth; but this produces so much sap in the straw that it is almost sure to take the rust and be destroyed. In this way I lost entirely the most promising piece of wheat that I ever saw.

To prepare land for wheat, it is best to apply lime, ashes, or other manure, to the preceding crop, and raise peas on the land with corn, for the two years' shift, which is common in this State. I have found orchard grass to yield very abundant crops. It will grow four feet high on good soil, and yields a large amount of fodder. I have sown about three pecks per acre, with oats in the spring. All grasses have to be sown with small grain to protect them from the heat of the sun, which will kill out almost any kind when young and tender. The crop of small grain will come off the first summer, and grass the following spring, although both are sown at the same time of seeding.

Herdsgrass may be sown at the rate of one bushel per acre; it grows best in low, moist land, and does well for grazing; but the crops of hay are light. I have got but one crop in a season. It holds to the soil with great tenacity, and is difficult to eradicate. All grass, for hay, ought to yield two or three crops per annum. I have cut clover three times, and gamma grass, also, when the land is very rich and supplied with good top-dressing, and the spring is seasonable. To sow grass for grazing it is best to sow two or three kinds together—clover and Timothy, clover and herdsgrass. Clover will grow with almost any other kind of grass and do well; but where land is scarce and the climate hot, it is far better to soil them by cutting every day, or twice a day—it is then fresh, sweet, and healthy; but if the weather is likely to be bad it is wise to lay up some for a rainy day; a d it may be kept in an open loft almost green for two or three days, when scattered thin. But to cure hay well requires some experience and close observation. And, first, to have it good, cut it before the seed matures, when in full-bloom and free from dew. If the crop is heavy it is economy to have square sheets made of coarse cotton cloth, as nearly water-proof as possible, to throw over the piles of hay in case of a shower of rain or a storm; a good brick tied fast to each corner will hold it down to the earth. One cutting of hay will pay for the cloth, and a single rain will spoil that; but if the cloths are well taken care of they will last twenty years, and pay for themselves ten times over. But if, in a season like the present, the grass and weeds are about to overrun the clover, cut all off together in the fall for hay, and the clover will continue to grow through the winter, and the others will be destroyed.

I have thrown these ideas together in such a crude shape that I fear they will fail to have the effect which truth is entitled to, and will be read only by those who may desire to practise upon them.

With consideration of respect, your obedient servant,

HENRY M. EARLE

WELSH'S MILLS POST OFFICE, CABARRAS COUNTY, N. C.,
November 15, 1852.

SIR: I received your Circular last week, and herewith send you some information in reply to the questions annexed to it.

Wheat.—This year's crop is abundant in all directions, as far as I have heard from. We have the Mediterranean, the blue-stem, bearded, and red spring wheat; but the May wheat is the best for this county; it comes early, and the stem is strong and not easily blown down. The time of seeding is the month of November, and time of harvest from the 1st to the 10th of June.

Whilst all other varieties were in cultivation, and finally run out, we had to turn to the May wheat that had been kept alive for a quarter of a century; the average yield, about ten bushels per acre; from two and a half to three pecks is a plenty to sow per acre. No objection can be raised against it, only the late frosts in the spring, that sometimes overtake it.

Corn.—The white corn is most esteemed and mostly raised in this county. This year the crop is abundant in every direction. There was no lack of rain from planting-time until corn was thoroughly made. The average yield, I think, must be about thirty bushels on upland, and on bottoms forty bushels, in my humble opinion. There was more corn raised this year than in 1850 and 1851. The time of planting from the first to the thirtieth of April. The mode of cultivation is, to break up the ground well, plough deep, and plant the rows four and a half feet apart each way; thin out to two stalks in the hill, and, if the land is thin, leave one stalk only.

The best mode of raising peas is to plant, when the corn is planted, two and three to a hill, and if some of them do get overlaid in working, the balance will mature sooner and bear larger vines and larger pods than if sown broadcast or otherwise planted. There are but few farmers that raise peas for market.

I will remark that I counted from one ear of corn this season 1,220 grains; the average price of corn in the nearest market is thirty cents per bushel.

Cotton.—This is the great crop of the county; the season has been favorable from the commencement; there was, generally, a good stand on the ground. No other crop is so faithfully attended to as the cotton. There is a great crop this year, and I would say that there will be, on an average, 400 pounds clean cotton to the acre.

For the mode of cultivation, I would recommend to knock down all old pods, branches, leaves, and the like, early in the spring, between the old rows; then turn the furrows on this, with a plough drawn by two horses, from four to six weeks before planting, giving time for the ground to settle; then split the ridge with a narrow plough; drop the seed, and cover with a light harrow drawn by one horse.

Most farmers keep a field constantly in cotton from year to year, and, by adding a little manure, improve their cotton land. This fall has been excellent for gathering; no frost to kill up to the 10th inst. The average price in the nearest market is $8 50. Farmers are improving in their cultivation of cotton, &c.

Oats could be raised with fine success; but the best ground must go for cotton, next best for corn, and the third quality for oats. But if oats had the ground cotton gets, the yield would be twenty-five and thirty bushels per acre.

This was a fine season for oats; and they are a fine feed for horses. The weight is about thirty-three pounds per bushel, and price twenty-five cents per bushel.

Rye.—None raised in this section of country.

Barley.—None raised, but would yield well.

Tobacco.—None raised in the southern counties of North Carolina

Hemp.—None cultivated in this region.

Clover.—None raised for horse or pasture.

Sugar cane.—None raised in this part of North Carolina.

I cheerfully submit my remarks to you; and if you think them worthy of a place in your excellent Patent Office Report, they are at your disposal.

Yours, with respect,

JOSHUA HARRIS.

To the COMMISSIONER OF PATENTS.

JEFFERSON COUNTY, VA.,
December 22, 1852.

SIR: Having received a copy of the Circular addressed from the Patent Office to the agriculturists of the United States, I feel prompted to comply with the request it contains, to give such information as I may be able to do of the condition of the agriculture of this district, although it is quite probable I shall not be able to communicate "new facts or discoveries of practical value to American husbandry." The particular portion of the "valley of Virginia" of which I now write, lies in latitude about 39° 15′, bordered on the southeast and east by the Shenandoah river, which runs along the western base of the Blue Ridge mountain. The soil and climate have been long esteemed particularly adapted to the culture of wheat, which has for many years been regarded as the staple crop; corn having been generally raised only for home consumption, and field culture confined to these two varieties of product, besides clover, which is universally cultivated as a fertilizer. The soil is what is generally termed limestone—that being the principal mineral product of this district, and the waters being strongly impregnated with the carbonate of lime. But there is, notwithstanding, considerable diversity in chemical and physical composition, and in fertility; the surface in some places presenting a slaty structure—in some abounding in fragments of silicious stone, varying in size from that of a hat to that of a pea; in many presenting a deep and rich alluvial mould—in others many fragments of sandstone, and generally a large proportion of yellow clay—this last being the character of the subsoil.

The price of farming land here varies from forty to sixty dollars per acre, depending upon location and improvements. The usual mode of cultivating wheat is to plough a clover field, which has been well grazed during the summer, in the month of August, to the depth of about five or six inches, harrow once, lay off in lands of 16 feet, and from the 25th of September to the 15th October, but three weeks earlier for Mediterranean wheat, sow broadcast $1\frac{3}{4}$ bushel to the acre of every variety except Mediterranean, and 2 bushels of that. The ground in corn is usually at the same time sown, without any preparation; the

corn frequently still standing upon the stalk in the field as it grew; the wheat covered, in the fallow-field, by the harrow being passed twice over it, and in the corn ground by the single or double shovel plough, or sometimes, when the corn has been cut and shocked, by the harrow alone; but little difference, if any, being observable in the result. The corn-ground wheat usually receives clover seed in the following March at the rate of one gallon to the acre, sown broadcast, and plaster of Paris either at that time or the preceding fall, at the rate of a bushel per acre. I have also applied the harrow to wheat in the spring when I sowed clover seed, with, at the time, apparent injury, but decided ultimate benefit.

Our harvest commences ordinarily about the middle of the last week in June, and lasts ten or twelve days; being usually over by the close of the first week in July. Cradling is still the prevailing mode of reaping, three to four acres, carefully cut, to the cradle, being accounted a fair day's work; but the reaper has been for several years used by some farmers—the preference having been generally given to Hussey's; but in that I think public sentiment is undergoing a change in consequence of the very great advantage of McCormick's of depositing the wheat to one side, thus avoiding the loss of time at that busy period resulting from occasional failure to get the wheat out of the way, and enabling a small force to accomplish a decidedly greater amount of work. It is understood, also, that McCormick's reaper is less liable to choke, from whatever cause. The variety of wheat preferred for strong land, or fallow land generally, is a red wheat called the Zimmerman; for corn or thin land generally, the Mediterranean or white wheats. The drill is rapidly taking the place of the broadcast in seeding; Demmock's being decidedly preferred to any other yet used here.

An average crop from corn-ground and fallow, for a period of ten or twelve successive years, actually saved, threshed, and delivered into the mill or to the merchant, from good land, well cultivated, does not exceed, I think, fifteen bushels to the acre; but the yield varies very much, from 25 to 30 bushels down, a fair prospect being sometimes blighted by rust or fly.

In the former of these evils, no preventive or palliation even is known; for the latter, grazing by sheep is, by some, esteemed a remedy or preventive, the habit of the close grazing of wheat, particularly the Mediterranean, having latterly decidedly increased.

The greater part of the wheat raised here is sold to the miller in the neighborhood, ground, and sent as flour to Baltimore; the price being regulated by the price of flour in Washington, deducting the cost of transportation, about 45 cents per barrel. I obtained for my wheat from the year 1837 to the year 1847, an average of one dollar per bushel; since that the average has been considerably less. Five bushels of wheat are allowed for a barrel of flour, which is believed to be rather an excess; the offal usually offsetting the cost of the barrel. This year the price has varied from 80 cents in the summer to $1 in December.

Many persons prefer to apply their manure as a top-dressing, either in the shape of unrotted straw or of muck, to the wheat in the fall or winter; others plough it under for the corn crop in the spring; twenty four-horse wagon-loads being considered a good dressing in the latter case, and half that in the former. I have applied guano to wheat, at the time of seeding, at the rate of 300 pounds per acre, with decided benefit, but

doubtful profit; the cost per ton on my farm having been about $60. Having tried both methods, I found it advisable to mix a bushel of plaster per acre with the guano. I have found, when smut existed in my seed wheat, soaking it in a solution of salt or blue-stone, and afterwards rolling it whilst wet in slacked lime, an effectual remedy. The hand screen—an implement introduced here within three or four years, and costing about $10—has been exceedingly effectual in removing cockle, scarcely a grain remaining. Weevils are scarcely known here. The fallow wheat is succeeded the following year by corn. For this crop the ground is broken up as early as it is in a proper condition to be ploughed in the spring, beginning usually with the middle or the latter part of March, when the ploughs will break about an acre and a half each per day. The plough used is the three-horse bar-share. Should it be meadow ground, however, it is broken the previous fall as soon as practicable after seeding, in order that the sod may be completely rotted and merely harrowed and laid off in the spring. The laying-off furrows cross each other at right angles, four feet apart each way; some persons using for the purpose only the single shovel plough, and others preferring to use the bar-share, with two horses, in crossing, as affording a better bed for the seed. Corn-planting usually occurs between the 20th of April and 10th of May; sometimes, however, commencing a few days earlier, and occasionally continuing till late in May; the latter-planted corn, not unfrequently, with propitious seasons, equalling, and sometimes outstripping the early. About six grains are dropped to the hill, which are thinned to two or three when the corn is six or eight inches high; the corn is covered with the hoe. The cultivation of this crop once with the harrow, and repeatedly with the single and double shovel ploughs, occupies our agricultural labor uninterruptedly, with the exception of a few days immediately after planting, devoted to the repairs and making of fences, till hay making and harvest; the former commencing about the middle of June. Plaster is sometimes applied to the hill after the corn comes up, and sometimes omitted. If any improvement has been lately introduced in the cultivation of corn, it is probably in running a furrow with the single shovel plough, midway between the rows, in one or both directions, before harrowing, and very soon after the corn comes up; this advances the tillage, and the harrow acts more effectually; the roller is sometimes used with much benefit at this stage. A fair average crop of corn in a series of years from good land, well tilled, is from 25 to 30 bushels per acre; the price about 50 cents, varying from 40 to 60. The corn is usually ripe enough to cut up by the 20th of September, and is shocked and housed during the fall and winter; sometimes not completely till spring. The common white and yellow varieties are cultivated; that known as the Dutton has been tried and abandoned as unproductive.

I have the honor to be, sir, most respectfully, your obedient servant,

G. W. TURNER.

To the COMMISSIONER OF PATENTS.

GLEN WELBY, FAUQUIER COUNTY, VIRGINIA,
Near Rectortown P. O., December 16, 1852.

SIR: A Circular from your department, requesting information upon various subjects connected with the agricultural interests of our county, was handed me a short time since by my neighbor, J. S. Balthrope, esq., requesting that I would answer some of the questions therein proposed. In obedience to his wishes, and actuated by a desire to contribute such aid as I can to a cause so important, I have penned the following remarks, relative to the crops most attended to in this portion of the State, of which you are at liberty to make such disposition as you think proper.

In reference to the wheat crop, I will state, that for the past three years we have been using guano in its production; previous to that time it had been used in very small quantities, in the way of experiments, the result of which led to its use by almost every one who could spare the money for its purchase, or could procure it on credit. The gain per 100 pounds of guano is about five bushels of wheat. In every instance within my own experience or under my own observation, it has paid a better profit on old and exhausted than on well and partially-improved lands. The kind of soil which appears best adapted to its use is the cold glade, or what we call white oak soil; though it shows its effects upon every kind of soil in which I have known it tried, except in one instance—and that was on a field of red, and very loose or chaffy land.

Our usual time of commencing to seed is about the 20th of September, and of finishing about the 20th of October, varying of course slightly, as the season and weather may dictate. This season very few began earlier than 1st of October, and those who did, suffered from the attacks the Hessian fly. No preparation of the seed is practised generally, except to get it as clean as possible of rye, cockle, and chess; for which purpose, the fan, and in some cases a revolving screen, are used; which last machine no farmer who is animated by a laudable pride for the appearance of his wheat fields should be without.

The quantity sown per acre is from one and a half to two bushels. My experience is in favor of the largest quantity named; and, invariably, when I have lessened the quantity from that, my crop has been affected thereby. We plough but once previous to sowing; a second ploughing makes the land too light; and, consequently, the wheat is more liable to be thrown up by the winter.

We plough from six to nine inches in depth, and, where there is any turf to be turned over, find the old-fashioned bar-share plough the best; in light or stubble land, the McCormick, or some of the lighter cast-iron ploughs, will answer. The quantity of wheat raised per acre, without guano, on the fallow fields in this part of the county—I mean on those lands tolerably well improved—will average about twenty bushels per acre, and the corn-land about from twelve to sixteen bushels. This applies, of course, to years when the wheat crop has not been afflicted with any serious disaster, which sometimes is the case. The use of guano—150 pounds per acre—will increase these yields at least seven and a half bushels per acre. It will also facilitate the ripening of the wheat, rendering it less liable to *rust*, (in my opinion the greatest enemy to the crop in this region,) and will also produce a luxuriant growth of clover; which alone, if not grazed off closely, and is suffered to decompose on

the land, will fully pay for the cost of the guano in the greatly improved condition of the land. Previous to the use of guano, the usual practice was to succeed the fallow wheat with a crop of corn, and succeed the corn with wheat the ensuing spring, and while in corn-land wheat, sow clover-seed, and the fall after the clover matures, which is eighteen months from the time the clover-seed was sown, again fallow and put in wheat. The conviction, however, that clover, either with or without Timothy, should always be sown when guano has been used, has led, in most cases, to a change in this system; and few, if any, will be so injudicious as to fail to sow grass-seeds after guano; clover alone is generally sown, it being considered a much greater improvement of the soil than Timothy; though where the land is flat or glady, Timothy should always be, and generally is, mixed with the clover seed. The time of sowing grass-seeds is from 20th March to 1st April. I have sown as early as 1st March, with success; Timothy seed usually does better if sown in the fall of the year, when the wheat is sown.

The drill for seeding wheat is used by many, and is much liked; it is thought to save seed and labor, and the wheat is less apt to be winter-killed. It requires, however, that the land should be in fine order and clear of stone and clods, in order to do good work. I do not think the roller of any advantage, except to break the clods, and in most instances the harrow will accomplish that as well; and when it is designed to sow clover-seed in the spring, I think the smooth and somewhat compressed and hard surface left by the roller is unfavorable to the taking of the clover.

When the ground is well turned over, and has been gradually settled by the rains, the best mode, in my opinion, of seeding wheat is, to lay off the land diagonally across the ploughing about 16 or 18 feet in breadth, sow the wheat and guano on the rough, and then cover it with the large three-horse harrow, lapping about half way, so as to make it a double harrow when done. The practice of some, of cross-harrowing, I am opposed to, as I think much wheat which had been covered by the first harrowing is uncovered; such, certainly, is the opinion I have formed from personal observation. If the land requires harrowing before seeding, the wheat should be put in with cultivators, which I greatly prefer to ploughs, either single or double shovel, from the fact that if there is much or any blue-grass, it is less disturbed by the former than by the latter, and a better surface is left to the field, which renders it easier to save the crop.

In reference to the yield of wheat per acre, as before mentioned, I deem it proper to add that in some instances, both as it respects the fallow and corn land, the yield is much greater, even as high as thirty bushels and more for fallow, and twenty and upwards for corn land; though the instances are not sufficiently numerous to affect the average, as before stated.

In regard to the corn crop, which is scarcely, if at all, inferior in importance to the farmer in this region, the result of the use of guano has been beneficial to this crop, from the fact before stated—that no judicious farmer will now immediately succeed his fallow wheat with corn; but, if guano has been used by him on his wheat, he will also sow grass-seeds, which he will suffer to grow to maturity; and, after the rest of about two years, will then plough it up for corn. Some experiments have been made with guano in the hill with the corn, and although for

the first few weeks after the corn comes up the effect is perceptible in the growth and color of the plant, after a short time that difference ceases, and it is probable that in a very dry season the guano will tend to fire the corn. I have seen one instance this season, in the adjoining county of Fairfax, where about 250 pounds of guano per acre had been ploughed in, and the result was a good crop of corn; the land is naturally very poor, and of a light gravelly character, and, without guano, would perhaps have produced a very light crop. If applied to corn at all, it should certainly be ploughed in at least six inches. This season was exceedingly wet, and, of course, prevented the guano from firing the corn; it would require a dry season to test it effectually.

My plan is to plough no field for corn that has not rested in grass at least two or three years; and five years I prefer. I plough it in the spring with the bar-share plough to the depth of about eight inches; harrow it well—twice, if necessary; lay it off each way in rows three and a half feet apart, and drop the corn well rolled in plaster—six or seven grains, and often more, in the hill; and, whether I am late or early in planting, I always cover it deep, either with hoes or the corn coverer—an implement recently introduced into this neighborhood, very simple in its construction, and well adapted to its purpose. I prefer a good number of grains in the hills for the following reasons: That the combined force of the germinating grains, when a good many are together, more easily breaks through the crust, which is apt to form on the surface, and suffers the plant to come through, and if attacked by the cut, or bud worm, or the *ant*, there is greater probability of a sufficient number of stalks escaping. The deep covering prevents the corn from rotting in the ground if planted early, and the ground should be wet and cold; and, if very dry, it will come up better, from the fact that it has more moisture than it would have if covered shallow. In support of the correctness of my opinion in this particular, I will state that I have practised upon it for ten years, and have not, I think, used two bushels of corn in the whole time for replanting.

As soon as my corn attains sufficient size I go over it with the three-tooth cultivator, running as near as practicable to the corn, and also running the way the ground was first laid off, which last-named mode renders the corn less liable to be covered by the dirt and clods. If I have sufficient force, I follow the cultivator with the hoe, carefully uncovering any that requires it, and stirring the earth around such hills as have not been approached sufficiently near with the cultivator. After going over it in this manner, I again commence with the cultivator, and go over it the opposite way, following with the thinners, leaving two stalks generally, and in the richer spots three stalks, in the hill. The next cultivation is with what I call the rooters, being narrow plates three inches wide, and not less than 18 or 20 inches long, and fastened to the mould-board [?] of the plough, either with an eye or a bolt and lap; with these I run very close to the corn without covering it up, and very deep, which, at this stage of the crop, is highly essential; for if the season should prove a dry one, the increased depth to which the roots of the plant have been invited will prevent its being very greatly affected by the drought; and, if a wet season, it will cause the water to sink more readily, and not remain on the surface, or wash in gulleys, as frequently happens. I split out the middle in this cultivation, either with the root-

ers or with the long and sharp single shovel plough. My last cultivation is with a single shovel plough, next to the corn, not very long, which throws the dirt up to the corn, and furnishes some support against the winds, which sometimes prostrate the stalks, and either injure the crop quite seriously or render it more difficult to secure. In this cultivation I split the middle with the cultivator; these leave a smooth and beautiful surface to seed on; and it avoids leaving a furrow in the middle of the row, which is the case when the plough is used in the last cultivation, and is the cause of the corn fields being so often washed into gulleys.

The foregoing has been my method of cultivating corn for the last ten years, during which time we have had two excessive droughts—one in 1845 and the other in 1849; and my crop has never been less than eight barrels of corn per acre. In 1850, it was upwards of ten barrels; and this year, so far as gathered, it exceeds ten barrels per acre. I have finished one small field of twenty acres, and have measured up two hundred and three barrels, exclusive of offal corn, of which, however, there is not much. (A barrel is five bushels.)

The usual time of planting is from 20th April to 1st of May; in some cases rather earlier in beginning, and sometimes rather later in finishing. I have twice, in the last ten years, begun as early as 6th April, and on both occasions succeeded. Those seasons were, however, very forward.

The length to which I have unintentionally extended these remarks prevents my saying anything respecting the results of my experiments in the use of plaster on wheat and grass.

I have the honor to be, very respectfully, your obedient servant,

RICHARD H. CARTER.

The Commissioner of Patents.

Salem, Fauquier County, Va.,
December 8, 1852.

Sir: Your Circular, desiring information on the various branches of agriculture, was duly received. I now proceed to answer some of the interrogatories contained therein.

Your first and second inquiries relate to the production of wheat and corn. By request, Mr. R. H. Carter, who is more systematic in his farming operations than myself, has stated in full his mode of culture, and the general result is a decided approval of his system of operations.

Your next relates to the production of oats, barley, peas, and beans. For the oat crop, I usually set apart a portion of the poorer or rougher sort of my stock land; plough as early in the spring as the frost and wet will allow; sow on the rough one and a half bushel of seed to the acre, put in with the harrow. If the application of grass-seed or plaster is designed, it is well to lay off the ground again in lands eighteen feet apart for a guide. A top-dressing of plaster will greatly promote the growth. Average yield, twenty-five bushels per acre. The crop is an exhausting one. Barley not raised with us. Peas and beans usually planted with the corn; generally not beyond the amount required for table use at home. If we have a few surplus bushels, they will command a dollar a bushel, if white.

In reference to the quantity of hay cut from an acre, I have never correctly tested it; but from our usual way of estimating it, by the load or stack, we hear that good meadow land will produce more than two tons. In laying down our meadow land, if the soil is rolling we generally use equal quantities of Timothy and clover; sow at the rate of a bushel to six acres. In most cases, the seed is sown with wheat or oats, without any extra preparation, except to apply manure, if necessary, and harrow to a smooth surface. On wet or clayey land we use Timothy, or a mixture of Timothy and red-top grass. It may be sown with wheat or oats, as above stated; but to insure success I think it is best to fallow the land, harrow it down as evenly as possible, lay off on lands sixteen feet apart, sow in August or September, as the season may dictate, at the rate of a bushel to five acres, and lightly harrow it in.

Cost of producing Hay.—Good meadow land well set in grass is worth fifty dollars per acre.

Interest thereon	$3 00
Cutting and stacking, one hand 2 days	2 60
Team and stacker, ½ day	3 00
Fencing stack	1 50
	10 10

Hay in stacks upon the meadow is usually worth from $7 50 to $8 per ton. When delivered in our villages it will bring from 40 to 50 cents per hundred. The fall pasture will amply pay for keeping the fencing and ditches in order, and snubbing, if necessary. Suppose an acre to produce two tons, it will leave the net cost of producing hay $5 05 per ton.

In reference to red clover being injurious to horses, so far as my experience and observation go, it is a preferable grass for rearing colts—will perhaps produce a more rapid growth than any other; but work horses cannot endure heat or fatigue when running on red clover. If the season is wet, I have found it to be decidedly injurious to horses, either in or out of use; but as an improver it is preferred to any other grass. The application of plaster will greatly promote the growth, and thereby enable it to impart more strength to the soil. On most of our lands blue-grass will come spontaneously, and affords an excellent grazing for work horses, and beef or dairy cattle.

Dairy husbandry has received but little attention as a business, though most farmers make a surplus of butter, which, at this time, will bring 25 cents per pound. This, however, is more than we have usually realized, owing, perhaps, to the cheap and quick transportation by the Manassy Gap railroad—an improvement just completed through our section of country.

Neat Cattle.—Cost of a good calf at weaning, three and-a-half dollars; first year's keeping, four dollars; second year, five dollars; third year, seven dollars; which would bring the animal to a little more than three years, at a cost of nineteen dollars and fifty cents; average value at that age—for heifers, twenty-five dollars; steers, thirty. I have never ascertained how much beef one hundred pounds of corn would produce. In reference to the difference between a Durham, Devon, or native animal, if

they are furnished with plenty of choice food, there is no doubt the blooded animal will improve the fastest; if the food is rougher, and the supply scanty, the native animal will get the advantage.

My plan to break steers to the yoke: When I have selected two of a neat, sprightly appearance, I confine them side by side in a stable or some convenient place; fasten the yoke securely, to avoid accidents. It is well to confine their tails, also. This can best be done by interplaiting the hair, and roping it with wax and cord. Let them out in a meadow or a field that is clear of obstruction. When they have wearied themselves down by running, as they will be certain to do, approach them frequently, and pat them. When they become a little pinched with hunger, they will take food out of the hand. With this treatment, in a few days they will become pretty tame; then hook them to a light draught of no value. Let them drag it for several days. After they have learned to master the draught conveniently, and become well accustomed to the yoke, they may then be put to work without any difficulty, taking care to load them light at first, and increase the load according to their strength and ambition.

Horses and Mules.—The latter are not raised with us. The growing of the former is profitable on farms that are remote from market, and well adapted to grazing and hay. The cost of rearing a colt until three years old: A good colt, at weaning—say four months—is worth twenty-eight dollars; first year's keeping, twelve dollars; second year, fifteen dollars; next twelve months, fifteen; which will bring the colt to three years, at a cost of seventy dollars. Average value at that age, ninety dollars. Treatment of brood mares: Having owned a stallion for several years, I have observed that mares are much surer to prove in foal when not suffered to run on red clover, or any sappy grass; if the season is wet it is best to keep them on dry food until the time of the horse's service has past. There is no objection to their being used, but they should always be used with a great deal of care, never overdone with heat or fatigue. When they have gone some eight or nine months, they should be kept apart from other horses, or at least see that they are not kicked or jammed by them; and when they are within a few weeks of foaling, it is well to turn them on a meadow or grass lot that is clear of ditches or abrupt streams, as mares are naturally inclined to foal near a stream of water; and I have more than once known colts to be lost by being dropped in, or so near a branch that they have fallen in before they were fully able to walk. In reference to the best way to break young horses to service: I am a poor hand to break a horse for the saddle; but, having been my own teamster for several years, my plan to break a colt to harness is to put him in a team with other horses, selecting a time when I am not compelled to load heavy. It is best to put on such loads as the team can manage with or without the assistance of the colt. Let him draw or walk at his ease. By indulging him a few days in this way, he will come to the draught as a matter of choice. In most cases this treatment will avoid making what we call balking or false horses, which often happens by trying to force the horses to drag draughts before they are able or know how to manage their loads.

Wool-growing.—I have but little experience in wool-growing. I believe it to be profitable in localities remote from market, and upon large ranges of good pasture.

Hogs.—Best breed, a cross of the Berkshire with the native. Cheapest plan to produce pork is to keep the pigs fat from the outset, or at least give them a sufficiency of food to keep them in a growing condition. I do not believe the growing of pork to be profitable beyond the number of hogs required to consume the stubble slops, waste apples, or such food as cannot coveniently or profitably be consumed by other stock.

Cotton, sugar, rice, tobacco, and *hemp* are not raised with us.

Root-crops, turnips, &c.—I sowed this year, as near as I could measure it by steps, two acres of poor land; applied four hundred pounds of guano; sowed the last of August; raised upwards of four hundred bushels. I believe if I had sowed the first of August, I should have raised a larger crop. I am now feeding them to my stock. I believe it to be the most valuable crop that could have been raised upon the land at the same cost of labor and manure. I also sowed turnips with my potatoes, at the last ploughing, in the latter part of June. They grew to fine size, but were unfit for table use. Land designed for the turnip crop should be broken up early in the summer, and cross-ploughed several times at intervals sufficiently near to keep down any weeds that may be inclined to grow on it. The ground will also become completely pulverized and retain the moisture much nearer the surface than land that has just been broken up; and, in case of drought, which often happens about seeding time, this treatment will insure a crop when a failure will ensue upon land that is fresh broken.

Potatoes, Irish.—I planted twenty bushels on about three acres of ground. They were of a variety that I do not know any name for. We call them the common white potato. I raised about one hundred bushels to the acre of a good sound quality. I also planted one bushel of the Mercer upon about an eighth of an acre. I harvested thirty-five bushels, and supposed I left ten bushels that were affected with the disease, (they were not worth gathering;) which would have made a yield of three hundred and forty bushels. I believe if I had planted upon the same land double the quantity of seed, the yield would have been much greater. If the Mercer had escaped the disease as well as the other variety, the crop would have been a very profitable one. Potatoes can be grown at a cost of twenty-five cents per bushel; and the time is not far distant when the crop will occupy an important place on most farms that have means of a cheap and direct transportation to market.

Yours, respectfully,

J. L. BALTHROPE.

BUCKINGHAM COUNTY, VA.,
December, 1852.

SIR: I will now endeavor to reply to your Circular requiring my opinion upon the various branches of agriculture in this (Piedmont) section of Virginia. The wheat crop used to be a secondary crop compared with the tobacco crop; but, since the use of Peruvian guano, the wheat crop is greatly enlarged by the use of it upon our old exhausted grain fields, and will make the yield double when 200 pounds is applied to the acre.

That amount seems generally admitted to be the right quantity, upon the principle both of profit and economy. I have strewn it broadcast, and ploughed it under, seven, eight, and nine inches, which was recommended by the first experimenters, believing it was putting it unnecessarily deep. I have, this fall, fallowed all my wheat-land the same depth, sowed the wheat and guano the same day and hour, harrowed both in together, and I never had wheat to come up better. It is a mistaken notion that, if the wheat and guano be sown together, the causticity of the guano will injure the sprout of the wheat. Smut in wheat this season has partially prevailed in this region; as a remedy, I washed my seed in strong brine that would bear an egg, then rolled in lime. As an experiment, I added guano to one bushel—literally every grain was coated over with lime and guano; sowed it so, and fully one half failed to vegetate. This experiment proved a failure. This washing in brine and rolling in lime was pursued till I procured blue-stone, in which I had more confidence; one pound of which was dissolved in about 15 gallons of water, in which I put five bushels of wheat, stirring and washing it well, skimming off with a cullender the false grain and chess. This process was done the day preceding, to get a supply of seed for the next day, remaining in pickle about eight hours; longer will not injure. When taken out, drain it well over the pickle barrel to prevent waste, then spread upon the barn floor to drip and dry; the wheat will absorb near half the pickle; add water to supply the deficiency, and half a pound more of the blue-stone for the next five bushels. The kinds of wheat cultivated in this section are various—say Mediterranean, dark grain, bearded, weak straw, and upon good land, apt to fall; Etrurian, white bearded, New York, white flint, early white, and red purple straw much approved. Smooth heads not liable to fall. For uplands the blue stem, or, more proper, Polish, which was distributed from the Patent Office. White, a large grain, smooth head, stands well, and very productive. I never cultivate bearded wheat; it is bad to handle, shatters badly, the straw is coarser than beardless wheat, and the chaff unfit for feeding. I estimate the chaff of 1,500 bushels of wheat, for feed and manure, worth $75. I grind my stock corn to a fine meal, giving to each horse and mule two quarts in the morning, two quarts at midday, and three quarts at night, well wet and mixed with a bushel basketful either of chaff or cut-straw, which will keep farm-horses in good plight. The wheat crop the present year is of good quality, except smut and damage by the joint worm, partially. The estimated average upon corn land, 10 bushels to the acre; upon low ground and tobacco land, 20 to 25 per acre. Our common time of seeding, and for several years past, has been early in September; much too early. Thirty to forty years ago, seeding was delayed until October, to pass the egging season of the fly. In a few years they were nearly destroyed for want of the wheat upon which to deposit their eggs. The few flies remaining made their attack in the spring, which is much less destructive than an autumnal attack.

Finally, from the great diminution of the fly, and scarcely a complaint of their damage, many good farmers thought they could seed wheat earlier, and commenced in September. I have seen it sown the 4th day of September in this county, and heard the fly had destroyed it; the Sep-

tember seeding has greatly augmented the fly by giving them a hot bed to deposit their eggs upon. The most unscrupulous will find that they must fall back to October seeding, or be subject to great damage by the fly. Late seeding and making the land rich, is the best remedy. Wheat is now selling in our market (Richmond) $1 10 for red, $1 15 for white, four months' credit, and our millers are trading upon the farmers' capital. Corn is planted from the 1st of April to the 1st of June, and is safe to cut and put in stooks of 100 stalks together as soon as the grain is glazed, about the 15th of September. My mode of planting is in rows four feet, ranging north and south, dropping four grains every two feet. Seed corn always selected from stalks bearing two good ears; I believe it is a peculiar kind, and will more generally bear double ears. Six quarts of tar is dissolved in 10 or 12 gallons of boiling water, with two pounds of copperas; when cold add the seed corn, which stands 48 hours. When taken out it will be dyed black, and very sticky from the tar; it is then rolled in gypsum, which adheres well, and planted. The copperas makes it offensive to birds and quickens vegetation. I break the land with a four-horse bar share eight to nine inches; a subsoil plough following, furrow by furrow, which breaks the hard pan and leaves no clay over to mix with the soil. The corn is dropped in that furrow upon the clay, and covered by soil about two inches, reserving the ploughed soil to be applied to the corn in cultivation, rather than place it below. Corn requires as much moisture as any plant in the vegetable kingdom; therefore, plant it deep, when it will seek and obtain moisture, and be rendered much less liable to tumble in storms. Our corn (or maize) is of many kinds. The distinctive names are white and yellow; a mixture of the old gourd seed and Tuscarora. The white makes the best bread; the yellow best stock corn, being a little richer.

I am happy to inform you that great and zealous efforts are now in progress for renovating our exhausted fields, from the Chesapeake bay, including the Piedmont part of Virginia, to the Blue Ridge mountains, by deep ploughing and subsoiling, the first and most important step in improvement; also, making and applying more home-made manure, the great auxiliary, clover and plaster, pea fallow, guano, lime, marl, and ashes. Our trans-Alleghany country, naturally rich, and as yet a young country, well adapted to grass and raising stock, has very little exhausted lands. Agricultural implements: first, the plough, the most valuable tool that ever entered mother earth; the kind most approved, and in general use, is called the Livingston, made entirely of cast-iron, and so ingeniously put together that there is but one screw, and that at the tail of the beam. I use No. 4, which is easily drawn by three mules. When the points are well chilled, and the land not too gravelly, they last very well, and are a cheaper plough than wrought iron when the farmer has to pay for strapping and pointing. The points, when worn out, can be pointed by breaking it off square, making a steel point to fit the breast of the plough, drilling two small holes, and rivetted on. They are, in every particular, superior to any other kind I ever used.

We have a wheat fan, of recent manufacture, by a Mr. Burnet, of the town of Staunton, for construction and power of execution, separating the false wheat and chess better and more perfectly than any other kind

I have ever used. No barley is cultivated. Multicole rye is sown to some extent near the mountains, and said to be very productive. The long and round potato succeeds well, and generally cultivated; no complaint of rot in the latter. Turnips, beets, parsnips, and carrots are only raised for family consumption; so, also, as to the pulse tribe.

In my communication, which is in your Report of 1851, I was very lengthy on the process of curing bacon and tobacco, which I prefer to refer to, rather than swell this communication to a greater length. Also, in that Report, to your inquiring what increased weight will 100 pounds of corn meal make in a stall beef, it reads "five pounds," to which you very properly made a note. I ask now to correct it, and make it *fifteen pounds*, which is a lower estimate than is generally made; which by many is carried up to twenty-five pounds. Their estimates are very indefinite; much depends upon the plight of the animal when stall-feeding is commenced. I hazard the opinion that no man ever received a fair return for his grain in stall-feeding a poor broken-down ox, which ought to be grazed two summers before stall-feeding. We are careless in raising grass. There are very few meadows. Those we have are generally laid down with herdsgrass and clover. Yield of hay, one and a-half to two tons per acre. The usual top-dressing is gypsum and ashes; February considered the best time of application. The second crop of clover will salivate; even the first crop of wet seasons, and too old when cut, with mould, and dried leaves near the ground. The rearing of sheep is increasing. In the western part of the State, where lands are cheap and kind to grass, I hear of many large sheep walks. We have but few regular dairies. I know of but one: Doctor Laburn, near Lexington, Rockbridge county, has a very extensive one, of seventy or eighty cows, and makes cheese fully equal to the best Goshen cheese.

Your Report is the most valuable document circulated by Congress. It is sought after by the people, and read with pleasure and instruction.

All which is respectfully submitted:

CHAS. YANCEY.

To the Commissioner of Patents.

Hickory Hill, near Forest Oak Post Office,
Montgomery county, Maryland, August 17, 1852.

Sir: I have been a constant recipient and reader of the annual Report of the Patent Office for several years, and I hope it will not be considered presumption in me to make one or two suggestions in regard to it The information elicited by it is certainly very important to the agricultural community, and every effort should be made to increase its value that could be resorted to. I therefore respectfully suggest, that, among the other inquiries found in the "Circular," it would be well to add one or two in regard to the *character* of the land in the various selections of each State, and also the price (minimum and maximum) of the same. In this age of improvement, the soil seems to receive its full share of attention; and I am satisfied that many of the advantages belonging to particular sections of the country, and not known out of those localities,

would; by being brought to the notice of other sections, be taken hold of, and thus their value be fully developed.

To illustrate the above more fully, I will state, that in the State of Maryland the character and price of land varies from $1 20 to $2 per acre, owing to the various circumstances which attend its peculiar location, &c. Now, there are many persons who own land that would command the extreme price above mentioned, who have never dreamed that land, every way or easily cultivated and brought to an equal degree of fertility, can be purchased in the same State for a sum 98⅓ per cent. [less ?] Whereas, if this information could be diffused over the whole country, it might be the means of introducing enterprise and capital into those sections which need them so much, from others, where there is hardly room for their useful investment.

Very respectfully, your obedient servant,

GEO. C. PATTERSON.

To the COMMISSIONER OF PATENTS.

DOVER, DELAWARE, *December* 23, 1852.

SIR: In reply to the interrogatories contained in your Agricultural Circular of August, 1852, I have the honor to communicate the following information: Adopting the order of the Circular, I begin with

Wheat.—Guano is extensively used in this (Kent) county in the production of this crop. Generally speaking, the soil of the county was originally well adapted to the cultivation of wheat, but, by reason of hard tillage, without any return to the land in the way of manuring, it has, for the most part, been worn out for forty or fifty years; so much so, that the average yield of farms before the introduction of guano, some six or eight years ago, did not exceed, if it equalled, five bushels per acre. When I say that the average, eight years ago, did not exceed five bushels, I simply include such land as was then seeded, for a great portion of arable land in this county would not bring any wheat if seeded, without help. If all the arable land in the county had, ten years ago, been seeded in wheat—good, bad, and indifferent—I do not believe it would have averaged two bushels, or certainly not more than three bushels per acre, and of corn not exceeding eight bushels. Indeed, many farmers had almost entirely abandoned the cultivation of wheat. When I was a boy, I have frequently heard farmers in my neighborhood say they had not raised as much as they sowed. The quantity of land now seeded is, I feel very sure, more than twice as great as that sown ten years ago. The average product per acre of our land treated with 300 pounds of guano, is about fifteen bushels; without guano, about five bushels; so that the gain per 100 pounds of this manure may be set down at three and one-third bushels. The time of seeding with us varies considerably. If we sow on fallow, which is mostly used of late years, we commence about the 10th of September, and the fallow-land is generally all seeded by the middle of October. The time for seeding stalk-ground commences with the latter part of October, and lasts until the 5th or 10th of November, and, in some instances, even later. I have harvested wheat on the 15th of June, but our harvest usually commences about the 23d. The quantity seeded per acre is gov-

erned by the quality and strength of the soil and the time of sowing. If we sow early, less seed is required in the same ground than if sown late, and a stiff clay soil seems to require more seed than a light soil of equal richness, because the former will throw more wheat out in the winter season; but this last remark is not applicable to land seeded with the drill. The minimum quantity seeded is one bushel per acre; the maximum is two and a half bushels. We plough, generally, but once, and to the "yellow dirt," as the ploughman terms it, which varies in depth from four to nine inches. The yield per acre is constantly increasing in proportion as guano is more generally used. We know of no remedy for Hessian flies or weevils, though many expedients have been tried. We never suffer from the fly, however, except in a very warm, dry autumn or spring. The average price at our nearest market, in 1852, has been about one dollar. We generally sow clover on the wheat in the months of February and March; sometimes Timothy; and of late some farmers have commenced mixing rye-grass with their clover.

Corn.—Guano is also used in the production of this crop, and it is thought to pay much better on corn than on wheat or oats. The approved method of applying it is broadcast, and turned under to the "yellow dirt," the same as for wheat. The gain in bushels per one hundred pounds of guano is about five or six. I presume the average product per acre in this county is about twenty bushels. The cost of production per bushel, and carrying to market, cannot be less than twenty-five cents. The most approved system of culture with us is the following: Take a clover-sward and turn under deep, early in the month of October; then treat with fifty bushels quicklime; let the land lie in this way till about the middle of April; then cover with a good dressing of rich compost or barn-yard manure, and turn under some four inches with a small plough, in ridges or double furrows thrown together, each ridge being about four feet wide; then sign out or cross the ridges with furrows four feet wide, and drop five grains in each hill—this about the 1st of May. As soon as the corn gets up, the ridges, which should have been levelled at planting with a roller, are torn to pieces with a cultivator or harrow. At the same time, the replanting of the corn is begun. In about two weeks more, the cultivator and hoes are again used. In another fortnight, or thereabouts, the small plough is used for throwing furrows upon the hills, the corn being thinned or succored by lads going before the plough and pulling out all but two or three stalks, according to the strength of the ground. In every ten days the corn will want the cultivator again, until it shall have made the tassel. Care should be taken not to work the ground when it is wet, and to keep it worked rapidly when it is dry. We begin to "save fodder," as we term it, as soon as the corn has lost its milk, by cutting off the tops at the joint above the ear and stripping off the blades below the ear. Some persons believe that by cutting all off near the ground the corn is improved in weight; but I always "save fodder," and my corn always weighs fifty-six pounds, and frequently fifty-eight. I believe the best method of feeding horses and work-cattle is with chopped stuff-fodder, or straw mixed with meal made by grinding the broken ears of corn-cobs and grain together, especially if the farmer will keep his own mill.

Oats, Barley, Rye, Peas, and Beans.—These crops, except oats, are not much cultivated in this locality; and oats are growing into disfavor more and more every year, because of their exhausting the soil. I have seen but one crop of barley here for twenty years, and that was only a small lot. Rye is only sown on what we call marsh lands, which, though prolific for corn and rye, will not bring wheat. Peas and beans are seldom planted, except in small patches, for family use, and to supply the places of corn-hills that have been destroyed by insects at a time when it is too late to re-plant with corn.

Clover and Grasses.—There is very little hay grown with us on high ground, except clover hay, and sometimes clover and Timothy or rye grass mixed. Timothy and herdsgrass are grown for hay on our meadows or fresh marshes. The average yield of hay cut per acre on upland is about one and a half ton; some of the meadows will yield three tons per acre. The best fertilizers for meadows and pastures are ashes and bone-dust. Guano is the best for setting the meadow or pasture in grass. The quantity of red clover-seed sown per acre is about one-sixth of a bushel; of rye grass, one peck; of Timothy, one gallon. The cost of growing and saving hay per ton will average about five dollars. I cannot say that my experience shows that red clover is injurious to horses; but it seems to be the prevailing belief in this locality that constant feeding with red clover seriously affects the wind of a horse, whether he be used for the road or the plough.

Dairy Husbandry.—I do not know of a single dairy farmer in this county. Our practice here, from time immemorial, has been, for the farmer to eat what he wants first, and then sell the surplus, if he has any. Every householder, almost, whether in the villages or on the farm, keeps a sufficient number of cows to supply his family with butter and milk. Some farmers keep more, and thus are enabled to sell weekly a few pounds of butter to the storekeepers in the villages. We have not a market-house in this county; the merchant of the village is the grain-buyer, the fishmonger, the huckster, and general factor and caterer for his customers.

Neat Cattle.—The cost of rearing neat cattle till three years old is about twelve dollars, and the usual price at that age is about fifteen to eighteen dollars per head. The value of a good dairy cow is about twenty-five dollars in the spring, and thirty dollars in the fall, if fresh in milk. We have never tried any of the imported breeds of cattle in this neighborhood, except the Durham, until recently. Our experience is, that Durham stock will make rather more meat from the same quantity of food, but they are not so good for milk or for work cattle as our native stock. The Devon stock are now taking the place of the Durham. The oxen of this stock are better than the native for heavy draught; but where speed is required our well reared natives are far superior. We generally break our steers to the yoke by gearing an old one and young one together, having their tails well plaited together and tied with thongs. After coupling and working in this manner for a few days, the young ones are placed in the same yoke and fastened ahead of the old ones to the same draught; or, what is better, placed between two yoke of old steers. Care is always to be taken to unfasten their tails before taking off the yoke, when ungearing the young oxen. If our

steers are well grown, we generally begin to work them a little at two years old, so as to accustom them to the yoke.

Horses and Mules.—Until within the last five or six years it has not been considered profitable to grow these animals here, because we could buy them at four years old from the Western drover rather cheaper than we could raise them. Since the Mexican war, however, these Western animals have become about thirty per cent. dearer, and it is now considered cheaper to raise our own stock. The cost of raising a horse-colt till three years old is about sixty dollars, and a mule about forty; the price at that age will vary materially, according to the blood. Ordinary stock will bring about seventy dollars; but blooded colts and large mules will generally bring at three years old but little less than one hundred, and frequently one hundred and twenty-five dollars. The only difference in the cost of rearing common and blooded colts is in the siring and the loss of service of the dam for the first six months after foaling. A mare should be bred early in the season and while she is thin of flesh, and as soon as she has refused the horse she should be put in good condition and groomed with care and exercised nearly every day with moderate work; never strained or driven hard or very far in one day. We generally use our brood-mares in this way until a few days, or perhaps a fortnight, before foaling-time, when they are turned out upon the pasture during the day and kept at night with a good bed of salt hay in a large stall—say seven or eight feet wide. After foaling, the dam and colt are permitted to run together in the pasture until the colt is about six months old, and fed together morning and night in the same stall. By this time the colt has learned to eat grain and hay, and is taken from the dam and generally fed with all the hay he can eat in the winter and a quart of oats or three or four ears of corn night and morning. He gets but little more grain than this daily allowance until the winter preceding the spring he is to be broken. He is then allowed about double the quantity of grain, and should be groomed with as much care as a regular work-horse. From the time he is taken from the dam the colt should be accustomed to the halter and bridle, and when it is in contemplation to break him he should first have the collar put on his neck, and that suffered to remain upon him day and night. He should then have a surcingle put around him, and his head and neck should be set up by means of the bridle, bradoon, martingale, and surcingle. He should be treated with these for several weeks before being invested with the harness complete. His harness should be kept at the foot of his stall and thrown gently on him three or four times a day for ten days before he is to be geared up. If these preparatory measures are taken you may expect your colt to go off kindly and smoothly the first time he is hitched up with a gentle horse in double harness. After a few drives in double harness, which should always be so short and to so light a vehicle as not to weary the colt, he may then be tried in single harness to a light buggy. Care should always be taken to have the harness to fit in all points, and light draughts and short drives for the first season, so as to prevent the colt from getting into the habit of stumbling—that most provoking of all tricks of which a horse can be guilty.

Sheep and Wool.—I can give no information on these subjects.

Hogs.—Our farmers all agree that the best breed of hogs we have ever had in this section of country is a cross between the Berkshire and what

we call the Chester county breed; which last was brought here from Chester county, Pennsylvania, some eight or ten years ago. The raising of hogs here is a matter of convenience, and not of economy, as we can usually purchase our bacon in Philadelphia cheaper than we can raise it. For this reason few farmers raise any for sale.

If you will, for every hundred pounds of pork, take eight pounds of alum salt, five pounds of sugar, four ounces of saltpetre, and one ounce of red pepper in the pod, and make it into a pickle strong enough to bear an egg, and pour it cold on your pork, the hams and shoulders being at the bottom, you will have it well pickled; then let it remain for six or seven weeks, when it should be taken out and the hock-ends of the hams and shoulders, and the parts where the bones protrude on the fleshy side, lightly covered with red pepper. Let it then be carefully hung up and smoked every day for two or three weeks, with half-seasoned sassafras wood, and you will have as good hams as are found this side of Westphalia.

Cotton, sugar-cane, rice, tobacco, and hemp are not grown with us.

Root crops (turnips, carrots, beets, &c.) are not much cultivated as field crops.

Potatoes (Irish and Sweet.)—The average yield per acre on our land (which does not seem very well adapted to the Irish potato) is about 125 bushels of Irish and 150 of sweet potatoes. The cost of production and getting to market is about 18 cents per bushel. The most prolific and profitable sweet potato we raise is what is called the "Poplar root," which name describes the appearance of the potato. This variety frequently weighs from two to three pounds. The Mercer is generally esteemed with us the most prolific and profitable variety of Irish potatoes; but we have a variety called the "Pink-eye," which is decidedly better than the Mercer for table use.

Fruit Culture.—The culture of fruit is receiving increased attention here, and the spirit of enterprise is well rewarded. I have no doubt that apples enough can be grown on an acre to render the crop an exceedingly profitable one. I can say nothing with regard to the comparative value of apples and potatoes for feeding hogs and cattle. The varieties of apples that are mostly sought after here for winter use are the Newtown Pippin, and a handsome dark-red apple called "Carthouse." The last-named apple I believe is very little known in latitudes higher than 39°. It somewhat resembles the "Pomme d'Api" in flavor, but is very much larger, and in shape more round. The variety which seems to keep best or longest is the Butcher apple, and next to this is the "Grindstone." These varieties will keep till April and May. The most salable apples we send to the Philadelphia market are the Belleflower and Pippin. We have no such thing in this section as "blight" on apple trees, nor are we ever troubled with borers, of which so much complaint is made in the more Northern States. Our pear trees are somewhat affected by "blight" which some of our fruit-growers think is occasioned by electricity, and undertake to prevent by laying blacksmiths' cinders at the roots of the trees. The yellows on peach-trees we believe can be prevented, but do not think a tree can be saved after it is once attacked. This disease first manifests itself by causing the tree to put forth from the trunk or larger limbs bunches of very delicate switches or sprouts, bearing a very narrow, sickly-looking leaf. As soon as this symptom is

discovered the tree must be removed, root and branch, and the whole should be taken to some point remote from the orchard and burnt. If you attempt to trim off the diseased part and touch another tree to trim it with the same knife, the latter is certain to be contaminated. So, if you allow the diseased tree to put forth its flowers or blossoms after the symptom above named appears, the disease is certain to be carried by the bees to the surrounding trees. By this treatment, and by cultivating the orchard every year in corn or truck, we seldom hear of the "yellows," and our orchards are kept in good bearing condition for twelve or fifteen years. I know an orchard of fifty acres, immediately in this vicinity, that has been thus managed, and the owner told me to-day that at least 90 per cent. of the trees planted by him in 1838–'39 are still in their prime, and bid fair to last for several years to come. He has also made it a point to give his trees a dressing with soft soap at least once in three years. This keeps the bark in a smooth, clean, and healthy state. If you will dip your hand in the soap and then place it upon the body of a peach tree, you will see the prints of your fingers on the tree for at least twelve months. The soap may be applied with the hand when the tree is small, and with a large paint or white-wash brush when it has grown larger. It is only to be applied to the trunk, and care should be taken to prevent it from touching the leaves or small boughs, as it will destroy the leaves and injure the buds. The best method of transplanting known with us is the following: 1st. Have your trees fresh from the nursery. If practicable, the holes should be prepared to receive them before they are removed at all. 2d. Take up as much of the root as possible. 3d. Let the holes be dug at least three feet in diameter and two spits deep; then fill in the first or lowest spit with the soil; place your tree in the hole, having all the side roots in their natural position, and fill in with soil; no yellow dirt should be used in the filling. The soil should be moderately packed and rounded up in pyramidal form about the trunk of the tree, some two inches above the mark made by the ground in the nursery. 4th. Make a small trench around the periphery of the hole, so that no water shall settle around the trunk, but to secure water at the extremities of the roots. If the trees have been several days taken from the nursery, they should, before being set out, have the roots soaked 24 hours in water, so as to have the pores free for the early circulation of the sap. For the first two seasons the trees should be mulched as soon as the warm, dry weather begins—that is, have half-rotted straw placed around the root and lower part of the trunk, about a wheelbarrow load for each tree. If the ground is poor, about a handful or two of guano may, with great advantage, be mingled with the soil—that is, throw it in the bottom of the hole. I have little or no experience in grafting or budding. Our nurserymen furnish us with trees at a very moderate cost, and the trees are always what they are sold for; so that it is less troublesome, and not more expensive, to supply ourselves in this way than to raise our own trees.

We have not gone much into the culture of grapes or the manufacture of wine in this section of country; so that no suggestion which I could make would be of any worth, not being based either upon experience or observation. And, as to *forest culture*, our great desideratum is to get rid of our wood, of which we have a superabundance, as fast as possible. We have three times as much in the county as we need.

Manures.—Our farmers generally consider that the best plan of making manure is to have a stock of hay, straw, and other provender, which will be abundant for feeding their cattle, and some to waste, as they term it. The cattle should each have separate stalls where they are kept haltered at night, and be permitted to run at large, in the pound or barn yard, during the day, in the winter season. In the fall of the year, the pound is to be cleaned up, and the manure, if not applied on wheat, to be taken to the field intended for corn the next season, and covered, in large heaps, with soil. The pound, after having been cleaned up, is immediately filled with corn-stalks, to the depth of eighteen inches or two feet. After these are somewhat trampled by the cattle, woods-earth is hauled into the pound, in depth about three inches; then another layer of corn-stalks or straw. After this, the manure is taken from the stalls, and spread over the last layer of litter, and that immediately covered with woods-earth. This operation is repeated from time to time during the whole winter, care being always taken to keep the manure that is taken from the stalls and stables immediately covered with woods-earth or a deep covering of straw. Lime is extensively used of late years. Plaster is very seldom used as a fertilizer. It is the prevailing belief that of itself it has no fertilizing effect, but is useful as a top-dressing in time of a drought, as it attracts moisture from the atmosphere. In using lime on a worn-out soil, we generally begin with a dressing of twenty-five bushels of quicklime to the acre, on the top. If the land is suffered to lie without being cultivated for two years, it may then be broken up with a deep ploughing. Then it is ready to receive another dressing of quick lime, fifty bushels per acre, on top of the ploughed surface. This application should be repeated every fourth year. Guano is getting to be very extensively used, and it has never yet failed of success. It is, of all manures we have ever tried, the surest and the best. The only complaint we have to make respecting it is the exorbitant price at which it is held by the agents of the Peruvian government. We usually apply about from 250 to 400 pounds to the acre. The effect of 100 is very visible on worn-out land; and on the very leanest soil it may be applied at the rate of 500 or even 600 pounds per acre with increased success. The only question with us is, will it pay the landlord to furnish his tenant with this manure? More than one-half the land in this county is yet cultivated by tenants, who usually pay the landlord a rent, in kind, of about two fifths of the merchantable grain. It is a rare case that a tenant will agree to pay for any portion of the guano, though some of them are sufficiently intelligent to see their interest in doing so. As I have stated in the commencement of this communication, the increase in the yield of corn from the application of guano is about 5 or 6 bushels per hundred pounds. Taking 5½ as the average, this increase is equal in money (estimating corn at 50 cents per bushel) to $2 75. The cost of guano to the farmer is $2 25 per hundred pounds, leaving a profit of 50 cents. To this is to be added the increase in provender or fodder, which is equal to about $1 25 per hundred pounds, making the excess of product of 100 pounds of guano over cost, in money, about $1 75; from this is to be deducted, again, 25 cents per hundred for hauling and spreading on the land, leaving a clear profit of $1 50 per hundred pounds, or thirty dollars per ton. Now, out of this the tenant gets, first, all the increased yield of fodder, $1 25 per hundred, one fifth

of which pays him for the cost of hauling and spreading; and he also gets three fifths of the increase in the grain, equal to $1 65 per hundred, leaving the landlord only a yield of $1 10 per hundred for that which costs him $2 25. It may, then, be asked whether this loss of $1 15 is not returned to the landlord in the improvement of his land. We think it is not; for the increased yield, if the land be tilled the second year in corn, or be put in wheat, without an additional dressing, will not exceed two bushels of corn per 100 pounds of guano, or wheat equal to that in value; and, by the third year, the whole strength of guano is exhausted. I know, from several years' experience, that even if the landlord receive a rent of one half the grain, he will still lose money by paying for the whole of the guano. To this remark I may also add, that the poorer the land the greater is the increase per 100 pounds of guano; that is to say, if you apply 300 pounds to an acre of worn-out soil, which, without help, would not bring 5 bushels of corn, it will, with this dressing, give you 20 bushels or more. But if you will take an acre, just beside the first, that has been manured from year to year, until it is capable of yielding 30 bushels, and then apply 300 pounds of guano on it, you need not expect, at most, more than 40 bushels; while on land which, without guano, would bring 50 bushels per acre, the increase from 300 pounds would scarcely be 5 bushels. There can be no doubt that even at the present extravagant prices of guano, the farmer who cultivates his own land, if that land is poor, is handsomely paid back his outlay for all his guano judiciously applied, and has a margin left for profit, besides the additional advantage of having his ground covered with a thick crop of grass, which will furnish him the basis of an improvement less evanescent than that made by the guano *per se*, whilst the landlord who furnishes his tenant with this manure is paying at the rate of $1 per 100 pounds of guano, at least, for this mere advantage of having his land in a condition for speedy improvement. The quickest mode of renovating our worn-out soil, we have found to be the following: Take a field, and dress with 300 pounds guano, turned very deep; then sow 1½ bushel of wheat per acre, about the 10th of September; the wheat to be seeded with a drill. When the ground is thawed, in the latter part of February, or early in March, sow one-sixth of a bushel of clover-seed per acre; it is best to sow this on a light fall of snow, so that the melting of the snow shall carry the seed with it into the cracks of the earth made by the escape of frost from the ground. If it should, by reason of high winds, become dry before the clover has had time to get up, it will be well to run a rake-harrow over the field. This will benefit both the wheat and the clover. If the season is not excessively dry, the clover will be thickly set. My experience last year on this point was as follows: I sowed, in the autumn of 1851, a field of 20 acres in wheat, one-half of which was drilled and the other broadcast. Five years before that, the field was in corn; and so completely had the soil been exhausted, that it only yielded 135¾ bushels of corn, or about 7 bushels per acre. I gave the land about 280 pounds of guano per acre, when flushed for the wheat, and turned it under, to the yellow dirt. The clover was sown on all the field at the same time in March. The half that was drilled yielded enough wheat more than the other half to repay the seed; and there is now more than twice the quantity of clover on the drilled half than there is on the other. It is to be hoped that the next

territory we shall have annexed will be the Lobos or some other guano islands. They would be worth more to the farmers of this country, who compose four-fifths of its population, than Cuba and all the rest of the Antilles besides. Or if annexation is not to be the future fashion, some honorable means should be used by our government to effect such a negotiation with Peru as will enable us to buy our guano at a reasonable price. I have no doubt, if it could be had by the consumer at $40 or even $35 per 2,240 pounds, the government of Peru would lose nothing by the reduction, whilst it would greatly benefit the agricultural portion of our community.

I have the honor to be, sir, with respect, your obedient servant,

GEO. P. FISHER.

DIXMONT, PENOBSCOT COUNTY, MAINE,
December 9, 1852.

SIR: Your Circular, soliciting information on various subjects of importance to the agriculturist, came duly to hand.

I would say, that we live in a country comparatively new, of an inclement climate and a sterile soil; consequently, scientific farming has not made that progress which is desirable, and which it will make as its resources come to be more fully developed; and it is much more becoming in us to receive instruction than to undertake to impart it.

Guano is not used in this region, so far as my information extends.

Wheat is one of the staple products of our State, though, owing to the extensive lumbering operations carried on here, we are largely importing flour. The average product per acre may probably be set down at 12 bushels.

The kind most extensively raised is the Red Sea—time of sowing from the 25th May to the first of June—quantity usually sown per acre two bushels—harvested about the middle of August. Hessian flies do not exist to any extent in this vicinity. We find late sowing to be the most effectual, if not the only remedy for the ravages of the weevils; and as the Red Sea is the kind which has been found to do best late sown, it is preferred; average price of wheat is one dollar per bushel.

The various kinds of winter wheat have been tried, but with indifferent success generally; though isolated instances of very large crops have rewarded the efforts of some, who have made the experiment under very favorable circumstances. The circumstances most favorable to its growth here are early sowing—say latter part of August, on clean burnt land, newly cleared of wood, and so situated as to remain covered with snow all winter; quantity to be sown, from one bushel to five pecks per acre. One instance of wheat sown in an adjoining town, in 1850, under the above circumstances, yielded forty-four bushels per acre.

There was a considerable quantity sown in the fall of 1851; but the following winter proved so severe that its growth was a failure, and generally abandoned.

The variety considered best here is the "Schlosser Blue Stem," known here as the "Banner wheat."

The ground generally considered most favorable for the growth of wheat is greensward, top-dressed with stable manure, and ploughed under, the same spring it is sown, with a large breaking-up plough, to the depth of six inches, with four oxen.

Corn is raised here to some extent, notwithstanding the shortness of our seasons and the sterility of the soil, and is generally considered a profitable crop.

About forty bushels per acre may be stated as the average crop. The cost of production is usually stated at 75 cents per bushel, though we have no reliable data from which to count the cost.

The usual method in this region of preparing ground for planting corn is to spread and plough in about 30 or 40 loads of stable manure per acre; then drill about 4 feet apart for rows, with horse and small plough; then manure with one shovelful of old stable or hog manure to the hill, about 3 feet apart in the rows, and drop corn on it, four kernels to the hill, usually a hill of beans between each hill of corn, so that 6 or 8 bushels of beans are obtained in addition, with no perceptible diminution of the crop of corn. The corn crop is usually followed by a good crop of wheat without additional manure.

A very favorite way of preparing corn to feed to neat stock and hogs, and one much practised here, is, to crush and grind corn and cobs together, without shelling. The food thus given is less condensed, and considered more easy of digestion.

The hay crop is the great staple of this State and of New England. The saying is, "the more hay the more manure, and the more manure the more everything." In a climate like this, where the stern necessity exists for feeding cattle from 6 to 7 months in the year, it will readily be perceived that any considerable diminution of the hay crop must be followed by serious consequences, as affecting, more or less, every branch of business in the community; for nothing can fully supply its place, and the only alternative is to drive off the surplus stock to some more favored region, or slaughter it on the spot; either of which expedients proves highly injurious to the farmer, inasmuch as he is forced into the market when it is glutted, and at the lowest ebb. The exhausting process pursued very generally by farmers here, of selling off their surplus hay in seasons of plenty, cannot be too severely condemned in a country like this, where everything depends on the quantity of manure. No farmer should ever sell hay unless he is near enough to the consumer to make up the deficiency by the purchase of manure. Plaster is considerably used as a top-dressing for grass-fields, and on strong moist soils, with good effects; quantity usually sown, from two to three bushels per acre.

The quantity of hay cut per acre will probably average something less than a ton. My experience does not show that red clover is injurious to horses; on the contrary, it is considered a favorite feed for them.

Dairy Husbandry.—For the past year I find the product of my dairy to have been 125 pounds of butter per cow, which is probably not far from a fair average; though, on account of the severe drought, this estimate may be too low. The cost of cheese is usually considered as half that of butter, though the making of the latter here is regarded as most profitable, as butter is not imported into the State in so large quantities as cheese, as it does not bear handling and transporting so well as the

latter. In the treatment of milk for making butter in the winter, we pursue a course somewhat peculiar, which is as follows: After setting the milk in common tin pans for 12 hours, scald it, by setting the pans on iron vessels of boiling water, on a common cooking stove, and, after cooling, skim the cream off. By this mode of treatment the butter does not become bitter, as usual with winter butter, and is nearly as yellow as summer butter. Besides, by this course, the process of churning is very much accelerated. The process before mentioned is pursued by some in making summer as well as winter butter. Our rule for salting butter is, 1 ounce of finely pulverized rock-salt to the pound of butter, applied after thoroughly excluding all the butter-milk, by washing in cold water and rolling with a common rolling-pin; then pack in a clean barrel, either in lumps or solid, and completely cover with pickle as strong as it can be made; then add a bag of coarse rock-salt, and see that there is always undissolved salt in the bag. Butter made and packed in this way we find to keep perfectly sweet the whole year. Average price of butter here is 15 cents per pound.

Potatoes.—Till the prevalence of the potato rot, this was a very important crop for this State, not only as a feed for cattle and hogs, but as an article of export; and, next to the hay crop, its failure may be considered the severest calamity that could befall the farmers of this State, and its cause and cure have thus far baffled all the researches of the scientific and the practical; though I think its ravages may be somewhat abated by the observance of certain rules in planting. Select, if possible, dry land in good heart, turn the grass under the fall before, and plant as early in the spring as the ground can be worked, without manuring; and in the selection of seed, reject all small, affected potatoes, planting none but those of good size, fair, and suitable for the table. It is a prevailing opinion—and one I consider very erroneous—that small potatoes are just as good to plant as large ones, and, if the theory is true, better, for they will go over more ground. On an experiment I tried three or four years ago, it was found that where five or six bushels of good, selected Carter potatoes were planted in the midst of a field of the same variety of potatoes, unselected, but in other respects planted under precisely the same circumstances, scarcely one of the product of the former was found in the least affected with the rot, while of the product of the latter at least one-third was more or less affected. The Carters are generally considered the most palatable—at the same time they are probably the most subject to the rot of any potato of this region. The long red potato is considered the most prolific. Average potato crop, abut 200 bushels per acre.

The culture of the carrot, turnip, and beet has considerably increased since the prevalence of the potato rot, and they are usually considered profitable. Probable average of carrot crop, 600 bushels per acre.

The cultivation of all kinds of fruit adapted to this climate is fast increasing, and the farmers of this region are becoming thoroughly aroused to the importance of this subject, and manifest their interest by greater care in the selection and culture of the choicest varieties. We find this region peculiarly adapted to the growing of apples, plums, and cherries—I am inclined to think, also, of the pear; though the growing of the latter has not been sufficiently extensive to warrant us in speaking so positively as of the other fruits. It is now generally conceded, that ap-

ples grown in Maine are superior in flavor and in keeping properties to apples grown in any other State. The varieties regarded as best for winter use are the Ralston Pippin, the Newtown Pippin, Rhode Island Greening, and Baldwin, though the latter variety does not seem quite so well adapted to our climate as the others, being more liable to winter-kill. There is not a question that the raising of apples is one of the most profitable species of farming which can be pursued here; and the only reason why it has not been more extensively carried on is the disinclination which exists of doing business on so long credit.

Very respectfully, yours,

WILLIAM UPTON, JR.

To the COMMISSIONER OF PATENTS.

AUGUSTA, ME., *December* 28, 1852.

SIR: Your Circular, addressed to me as secretary of the Maine Pomological Society, was duly received. Approving, as I do highly, of the object and queries it embraces, it would afford me pleasure could I answer all the questions therein contained; but I will at this time take up the subject of "fruit culture," and give some information from facts, and the practical experience I have had in planting, pruning, and engrafting in this State and county (Kennebeck) for the last twenty-four years.

In answer to the question—"Is the culture of fruit receiving increased attention?"—I answer in the affirmative, that it is receiving very much, it being the most profitable crop the farmer can raise in Kennebeck county. One orchard in the town of Monmouth, owned by the Messrs. Benson, of Winthrop, (my native town,) consisting of some fifteen hundred grafted trees, three varieties—Roxbury Russets, Rhode Island Greening, and Baldwins—the land very rocky, so much so that it can only be improved for pasture for sheep, was purchased a few years since for about $1,000, which produced apples the next year that sold on the spot for eight hundred dollars; and another year since eight hundred and fifty dollars' worth were sold, paying more than 75 per cent. on the cost. Mr. Plaisted, of Gardiner, told me, a few days since, that he raised last fall, on a row of about 150 small trees, which I engrafted for him some ten years since with winter fruit, 150 barrels of nice apples. I might enumerate many more facts that have come within my observation, but will only state that every farmer who has a few acres of grafted trees receives more net income from them than from all his farm besides.

A farm in this city, consisting of some 60 acres of land, and good buildings, was sold this year that had about 400 grafted apple trees, most of them Roxbury Russets. The seller and buyer told me they valued the orchard more than half, which was $3,225. Several persons in our village raise apples, pears, plums, and grapes enough for home use, and some sell enough to pay their taxes.

We raise very large and nice plums—such as the Jefferson, McLaughlin, Washington, Imperial Gage, Purple Gage, Magnum Bonum, &c., many of which I grafted on moose plum stocks—a native and very hardy plum of this State, which will bear full in two years from grafting. Grapes thrive very well in this climate; some early sorts get fully ripe.

The comparative value of sweet apples for feeding hogs or cattle is considered equal to potatoes, and they are frequently grafted for that purpose, the hogs being kept through the summer in the orchard, to keep the soil light and to eat the apples as they fall; the rest being picked to feed them in the winter.

What varieties best to keep for winter use and for exportation: The best variety is decidedly the Roxbury Russet; it bears well; and, being hard and dry, will keep in a cold, dry cellar until October. Next best varieties are Rhode Island Greening, (keeps here till June,) Baldwin, Esopus Spitzenberg, Nonsuch, Yellow Bellefleur, Talman Sweet, &c.

We have not found a remedy for the "blight," or what we call the "sap blight," in apple or pear trees.

The best method of transplanting is to prepare the borders, or dig the holes, as they are sometimes called, by digging at least three times as large a hole as the roots of the tree to be set; then, unless the soil is very light and sandy, so as to cause the roots to extend downwards too much, spade up the soil to the depth of a foot and a half at least, and the growth will be very much promoted by this course. The tree should be set exactly as deep as it grew in the nursery; the roots will then take a natural position, and not be turned up at the ends, as they will be if the holes are dug too small.

The tree should be mulched with straw manure, sawdust, old tan, or something to prevent the escape of moisture at midsummer, which is better than watering often; it will keep the soil light.

Budding is not much practised, except on small stocks; cleft-grafting is mostly for larger trees or in the branches, and wrapped with clay or grafting wax, made of rosin, beeswax, and tallow.

Nearly all our fruit trees are being grafted, and many are enlarging their orchards, it being considered the most profitable crop raised. The more we raise, the greater the demand, with a better price. Other States can raise better fruit than we do, but none can compete with Maine for raising apples to keep for winter or for exportation; and it is my opinion that, if this State were a forest of orchards, as it was formerly a "forest of pines," we could export to Europe and other places, and find a ready market for all we could produce.

With great respect, I have the honor to be your obedient servant,

D. A. FAIRBANKS.

To the COMMISSIONER OF PATENTS.

JONESBOROUGH, WASHINGTON COUNTY, MAINE,
November 20, 1852.

SIR: In answer to your Agricultural Circular of August last, I will now proceed to make a few statements, as approximate to what is required as the nature of the various queries and my location in so high a northern latitude will permit.

Wheat.—During the last five or six years the cultivation of wheat has been almost entirely neglected; our farmers having become discouraged from the sure and fatal attacks of its natural enemies—the rust and mildew. This season some sowed spring wheat in small quantities, and enerally with success. One individual in this vicinity raised 9½ bushels

from one half bushel sowing, of bright, well filled, excellent grain; and some others were similarly successful. It is highly probable that we shall soon be able to raise wheat again, or, at least, the weather of the past summer would seem to indicate a return of favorable seasons for growing wheat. I hope our farmers, another season, generally, will feel disposed to plant a little; certainly it would lessen the expenses of our citizen farmers to no inconsiderable amount could they produce bread enough for family demands.

Corn.—I shall leave for corn-growers, and those who live in corn-growing lands, to describe their modes and success of cultivation. We raise but little corn, depending chiefly on the West for that great and important article of consumption among us. Our seasons will not justify the attempt to cultivate corn, any more than enough for an occasional mess through the green corn season, of which we Yankees are proverbially fond; hence arises the saying, "that a Yankee will eat his length in corn." Corn this fall is very high, ranging from 95 cents to $1 25 per bushel.

Oats will grow most seasons and on most any soil, though a sandy loam is preferable. I deem a spring-ploughing best, though others favor the fall. I do not think favorably of fall ploughing for any crop the succeeding year, especially of side-hill fields, or those lands located in such a manner as to be much exposed to the washings and drainings of our severe fall and spring rains. Will others give an opinion upon this matter? for I consider it one of much interest to the farming community. I have raised my best crops of oats from grass and pasture lands with a spring ploughing and early seeding—say the 1st of May. Oats are invariably worth, in fall, 50 cents; in spring, 60 to 75 cents per bushel. Persons desirous of making their hens lay well should feed them liberally with oats. Try it.

Barley is raised to considerable extent, for fattening hogs, feeding poultry, &c. Barley succeeding potatoes on the same ground, will seldom fail of a good crop; worth $1 per bushel.

Peas and Beans.—Raised on every homestead; nearly enough for family use. They are both easily raised, though June frosts are sometimes destructive to beans. Beans are worth $2 per bushel. Peas ground with oats or barley make an excellent living for hogs; generally worth $1 25 to $1 50 per bushel.

Neat Cattle.—The raising of stock is becoming very generally attended to in this vicinity. Inducements for so doing were never stronger, as beef, young and old, commands a high price, and our farmers are not troubled to drive to market themselves; the butchers going 20 miles distant from their slaughter-houses to the farmers' fields and pastures, purchasing and driving at their own expense. The supply the present season fails to meet the demand, and, as present appearances indicate, may continue so for years to come. It is also proved to be a profitable business, as compared with other agricultural pursuits, from the fact that he who raises beef for the market, as well as stock for the farm, is sure to have a *good* farm, as he consumes his hay at home, thereby producing manure; wherein lies the real secret of agricultural success. "The cost of raising till three years old," according to the principle of our "Down East" reckoning, "is all the animal will fetch at that age in the market;" but, in my estimation, is not the correct mode of count-

ing cost, for there is an actual profit over and beyond the cash value of the animal which most farmers but little appreciate, because of its seeming indirect aid. The worth of three-years-old heifers is $20 to $25, and steers $22 to $28 per head.

As to the different modes of feeding cattle, I have never experimented enough to give a satisfactory opinion. "How do you break steers to the yoke?" Yoke them when calves, certainly; when a year old handle them often, and in a spirit of kindness; learn them to draw light loads, if no more than a common draught chain with a billet of wood attached. If permitted to run till two or three years old, yoke them, give them a free, smooth yard or field, and let them be, to act their own pleasure for two or three hours at a time, only with a watchful eye upon them; in this manner they will soon become accustomed to the various duties of the yoke, and, what is more desirable, easily managed. Here it is no uncommon thing to see a yoke of yearlings drawing a light cart or sled; but I deem it a lack of sagacity in the owner. So far as my observation goes, it tends to stint the growth, and make small, unsalable cattle. Kindness should ever be used to cattle; and I know of no better mode to judge of a man's manner with his cattle than to see him enter the yard where they are: if rough, they will move about, and even run to escape his touch; if kind, they fear not his approach, but rather solicit his presence. Price of good dairy cows in fall, $20 to $25; in spring, $30 to $35; of working oxen, $65 to $125.

Grasses.—Quantity of English hay per acre, on an average, about 1¼ ton. The best fertilizer for highlands is stable manure. The grass-seeds preferred in laying down lands are red-top, Timothy, and on porous soils a quantity of clover is admissible. One peck red-top, 4 quarts Timothy, and 4 pounds clover, per acre, is a fair quantity for seeding. I think a mixture of seed preferable to all of either kind on the same or any soil. The cost of growing is near $5. (In your Report of 1850, you make me say $3, which is too cheap.)

Hay this season, owing to a failure in the crop, is very high; averaging $15 in barns. Those who have hay to sell are disposing of it at large profits over the cost of raising. What is very remarkable is that beef should be so high when the demand for hay keeps pace with and in advance of the supply.

Dairying.—Average produce of butter per cow per annum, about 150 pounds. Cheese, none of consequence made; butter-making being much the most profitable. The cost of making butter is not less than 14 cents per pound. Butter this season has not been lower than 16 cents, while for the last and present month 20 and 25 cents are paid, and glad to get it at that. Many individuals hereabouts keep cows and manufacture butter on purpose for the market, carrying it on their team wagons in quantities varying from 50 pounds to ¼ ton; and they say, "We make it profitable." Cellars are most used for setting milk in, though some have their milk-houses erected on purpose for their milk and butter business.

Treatment of Milk and Cream.—About the following is practised among our dairy women, so far as my observation and inquiry permit of speaking: The milk is strained into thoroughly cleansed pans, set in the milk room so long as cream will rise to the surface, which varies in different cows from three to seven days; it is then skimmed off, and put

in stone or earthen pots—stone much the best—and then churned in quantities to suit convenience. The old dash-churn is mostly used. Time was when patent churns of complex models and forms were much in vogue; but the cost of keeping clean, and the poor butter often made, caused an almost general return to the old churn with its perpendicular dash, which is now conceded, everything considered, to be decidedly the best. After churning is through, the butter is gathered, taken from churn, put into a tub selected for the purpose, and covered with pure cold water, well beaten and washed out, and then in tubs again, worked over and beaten by the hands until the butter-milk is all removed; then salt added "to suit the taste." After which, for winter use, pack solid into kegs, or, if soon to be offered in the market, "lumps" are preferable, as customers are more readily suited as to the choice of quality and quantity.

Potatoes suffered very materially from the rot the present year. Notwithstanding this serious impediment to potato growing, our farmers manifest a very great unwillingness to abandon so desirable and profitable a crop. All attempts to avoid the disease, and all the expended skill, theoretically and practically, have alike proved failures.

Farmers do not feel safe to plant extensively since the potato failed; but we find there is a way, though the rot come, whereby a fair crop may be secured. My mode for the last five years for raising potatoes has been much more successful than that of most others of my aquaintance. I use new land, ploughing the first week in May, and planting as early in the month as possible. I plant in hills, making furrows with the plough crosswise the piece ploughed, about three feet asunder, and six to eight inches deep; then drop the manure new from the stable or sheep-house, (the latter is preferred,) in hills thirty inches apart, and cut my potatoes, (not the small ones, nor do I plant them if I can get large ones,) putting three pieces in each hill, and covering as soon as dropped three to four inches deep. I seldom have a hill to fail of coming, and they are up and ready for the hoe the first time the last of June; then again, about the 20th of July they need rehoeing, which in my opinion saves them in no small degree from the rot, while it pays well otherwise, as the potatoes will be larger, with few, if any, small ones in the hill. The last of August, or the first of September, look out for the blight on the leaves, if it come at all, when I dig and put them in the cellar, before I allow the main stalk to become much affected by its ravages. Many think it best to let their potatoes lie in the ground till they "get done rotting;" but I differ with them, as I did so the first two seasons of the rot, and lost nearly all my potatoes, the same as they generally do now. I have put my potatoes in the cellar the first and second weeks of September, and planted some of the same the following May, and had them for use during the summer months, as good, as sweet, and as sound as of olden time. I prefer light, loamy, or gravelly soil for potatoes. Ten bushels of cut seed is sufficient for an acre; and a crop of 200 to 300 bushels a fair yield. I think thirty cents the average cost of producing potatoes; while in the fall they sell for 50, and in the spring 75 cents per bushel.

Sheep and Wool.—I consider raising sheep profitable to the farmer, aside from the benefit derived from wool. The profit attached to the production of wool alone is of little importance, aside from the actual wants of the family. We have no wool depôts, nor manufacturing

establishments, in any of the eastern counties of this State; and exchanging wool for cloth with the traders and wool-peddlers is attended with so great inconvenience and loss that our people, though formerly much accustomed to do so, have now generally abandoned the practice; wool is generally worth 20 to 30 cents per pound. Our butchers, the past season, paid as high as $2 per head for live lambs; and in the market the meat has been worth 6 to 10 cents per pound. On an average, it requires one ton of hay to seven sheep for winter fodder. Seven sheep, Saxony and Merino blooded, will shear 25 pounds wool, worth $6 25. They will raise, at common increase, six lambs, worth $10 50, making, in all, $16 75; while the only actual outlay and expense of production, save a little time, is the value of the ton of hay, which, in ordinary years, is $10 to $12, though this year it is much more. The wolves have been very destructive to sheep during the past season, killing probably 25 per cent. of the flocks in this vicinity.

Fruit culture is rapidly coming into favor with our agricultural community. A few of the orchards, the present year, produced from 100 to 300 bushels of apples. Some are planting new orchards, while others are nursing and grafting, and bringing to productiveness, those heretofore worthless. An acre of thrifty, productive apple trees will give yearly a greater amount of profit than the same ground, under any other process of cultivation possibly can. Apples are worth, on an average, 50 cents per bushel. Damsons and Egg and Sweet-water plums are also coming in for a share of attention.

Having dwelt briefly upon most of the queries propounded in your Circular applicable and adapted to our soil and climate, and which, if published, will occupy as much space as one correspondent, unless more interesting than I, is entitled to, I will now close. It is indeed interesting to our people to get the communications contained in your Reports from the farmers of the South and West, showing how differently they pursue the agricultural vocation, and what different results are obtained.

The good of the agricultural work emanating from your Office, I trust, is too sensibly felt by the farmers of the American Union, and too generally appreciated by all classes of the community, ever to be neglected or abandoned by our government. To agriculture and its vast resources, as well as to the enterprise and perseverance of its agricultural people, is our country chiefly indebted for its present conspicuous and honorable position among the nations of the earth. Let our people go on from acquisition to acquisition until they shall have searched well the hidden treasures of agricultural knowledge, and possessed themselves of all that well-investigated theory and thoroughly-tested practice can impart, to facilitate the cultivation and increase the production of the soil, and add to the well-being and dignity of man.

With high respect,

GEO. W. DRISKO.

BLOOMFIELD, SOMERSET COUNTY, MAINE,
December 27, 1852.

SIR: Your Circular of last August was duly received; but press of business has prevented my noticing its contents till now. In answer

to that paper I would say that guano has not been used in this vicinity, except as a curiosity. It has been used on corn-land once with good success; but living so far inland, the experiment has not been pursued. The time of seeding, about, as I stated last year, to wit, as early as the season will permit to the 10th of May, or delay till late in May. The intention of this is, to be too early for the weevil, in the first case, and too late in the last case. Early sowing is sometimes injured by early drought, and late sowing is exposed to the rust and blight. The quantity of seed not changed; about two bushels to the acre; though much doubt exists whether this may not be too much, if the seed be good. The average product per acre for this year, I think, may be set at from *twelve* to *twenty* bushels, where the weevil did not attack it, and meaning always on good fair cultivation. Harvested from the 20th of August to the 20th of September; land ploughed once or twice from four to six inches deep; and I have the pleasure of announcing that the crops are apparently on the increase, attended with a more healthy and natural appearance. No remedy worth much has ever been found for the Hessian fly or weevil; seed mixed with lime or wood-ashes, and lands treated with lime or other alkalies, may be somewhat better; but the sun has shone on the just no more than the unjust, in this respect. As to rotation of crops we have no regular system; some plough mowing, or pasturage, and sow wheat the first year; others plough sward-land in the fall and sow in the spring with oats and peas, or barley, and then dress it for a succession of corn and wheat. Wheat grows well on pasture-lands, broken in summer or early fall, and run over with a cultivator or harrow, and sowed in the early spring; market at home ever since the lumber business has been prosecuted to any extent, and large quantities of flour transported from the West; wheat worth per bushel from 6*s*. 9*d*. to 9*s*. Lands to be "seeded down" are sown with from ten to twenty pounds of clover, mixed with about from eight to twelve quarts of Timothy or herdsgrass, sometimes mixed with and sown with the wheat, and sometimes sown on afterwards and "bushed" in. Thus much for spring sowing. Winter wheat, much in favor now, is sown as early as may be, in the latter part of the summer and early fall, in every variety of fashion; some, even, sown very late, so that it will not sprout till spring. It is believed that good seed sown on broken sward-land, or other land not long up, ploughed from any time in June to the twentieth of August—and well put in, none the worse if dressed before or after ploughing—will be most likely to insure a good crop, yielding about the same as spring wheat. For the last season the crops have, to some extent, failed, owing, I think, more to very dry weather in the fall, and drier in the spring, than to winter-killing. One piece I saw, half of which was quite dry land and half a little more moist, all sown at once, of the same kind of seed; the moist part produced none, but the other was good. The reason I assign is this: The moist ground brought the grain forth and the drought killed it; but the dry part was too dry to vegetate till the rain came, and it lived well. Many such things pass unnoticed, and are taxed to the incapacity of the country to produce winter grain. Ground well ploughed and smoothed is successfully sown to wheat, and the wheat covered with a small plough with one horse, or a good cultivator. If it be sown to grass the seed may be put on and "bushed" in, as it should not be as deep as wheat, to

succeed well; and wheat is much better defended from frost to be down three or four or more inches, and also from drought.

Of guano, as dressing for corn, I have never known it used but once, and then only a teaspoonful to a hill, I think, and it was said to add greatly to the crop. The production of well dressed and well attended land is not often under forty bushels, and so on to one hundred and over. One case in Oxford county rose to one hundred and forty, and another to one hundred and twenty-five. In some cases rich spots of pasture are ploughed, without manure, and planted a little farther apart than usual, and, with plaster or gypsum, produce a cheap, good crop. Corn is variously stated as to expense of culture; some would say one dollar; but, with the proper allowance for betterment of soil, I think not over half that sum. Ground corn is undoubtedly better than raw, by the trouble and loss, and more, and if cooked, better still. As to the manure from a given quantity, it would be guess-work, for all farmers add something. Ordinarily ten bushels of corn would yield half a cord mixed. The ground is prepared by being ploughed one season beforehand, and cropped with oats, barley, buckwheat, or potatoes, with more or less dressing; then ploughed in the fall, and sometimes a coat of manure ploughed in again; ploughed in the spring; sometimes with another coat ploughed in; then a shovelful put into the hills, about from three to three and a half by two to two and a half feet apart. But much doubt exists whether we have not crowded our hills at the expense of the crop. On strong land perhaps the old method of four feet by three and a half, with four or five kernels, is not better than less distance, with two to four kernels, yielding more ears to the stalk, and larger. Some are beginning to plough sward-land soon after haying, and, with a good dressing, to turn in; then plant next season with good success. Corn-stalks are sometimes cut when the corn is well turned, and saved in any manner which suits, in stacks or in the barn. Others, and a majority, cut up the whole and dry it in stacks. Not much difference in stalks. Found to be good fodder.

Oats have been declining several years, and the last season not much over half the usual quantity was raised. Found exhausting, as it is said; but I am doubtful if seed thrashed with a flail, and never having seen a machine, by itself or ancestry, would not give a good, old-fashioned yield, worth thirty-seven and a half cents per bushel. Seed two to five bushels.

Barley is not exhausting so much, but is not a very certain crop; well sown, in proper season, pays well, and is a good grain, worth about seventy-five cents per bushel. None raised for distilling in Maine. Sown most any time from the middle, or even 1st of June, to some time in July. Crops from fifteen to thirty-five bushels. Seed two bushels to an acre. Good for hogs.

Rye is generally sown in the fall on ploughed or "burnt land." Yields from twelve to thirty bushels to one bushel, or one and a quarter on one acre. Worth from eighty three cents to one dollar, and is used in "Yankee brown loaves," and given to hogs. It is a good crop on proper land; generally sown on poor land.

Peas are raised to some extent as a renovating crop, recently, and are a good seeding crop. Though spots will vine too heavily they are a good crop, well sown on smooth land, yielding from ten to forty bushels

to the acre. Seed with one bushel or more. A good crop for hogs, and are in demand from fifty cents to one dollar and fifty. Used to grow seventy bushels to the acre, virgin soil.

Beans are a profitable crop, raised without much expense, but rather exhausting; generally planted with corn more than alone; were formerly thought to grow well enough anywhere, but are found to crave good mellow, or at least rich land. Seed near half bushel to the acre. Yield, clear of corn, 30 to 40 bushels to the acre, and are in demand at from $1 50 to $2 25 per bushel; are much used on shipboard, and found better than split peas.

Grasses sown as above stated, with wheat, barley, peas, &c., 10 to 20 pounds of clover, and 8 to 12 and 16 quarts of herdsgrass to the acre, and yields well, tilled and manured, from 2 to 3 tons of hay. Much depends on making such grass. Some cut and wilt it and then cock it up in small bunches, and, regardless of weather, overhaul it often to give it the air till nearly fit to cart. Others dry it in the swarth till fit to rake, like lighter grass, and when dry cart it. Fields, or mowing, are distinguished from meadows here; the former mean upland and the latter low meadow, or fresh meadows, in contradistinction to salt-marsh uplands; are manured as stated above; fresh meadows are sometimes flowed, and sometimes enriched by carting on rough manure, and, if necessary, harrowed over and sown with suitable grass, as Timothy, fowl meadow, red-top, &c., &c. Manure is not afforded on pastures unless ploughed, except occasionally a coat of gypsum. Cost of raising hay, from $2 50 to $3 per ton; as sold standing in market, from $5 to $10; and so on in dry seasons to $15. Red clover is not materially injurious to horses, provided they have it all sweet, but it is undoubtedly gaseous, and horses should not be driven on it but with great care. The same occurs with it as a "cut feed to some extent." The great danger lies in the leaves of early summer. They die as the clover shades them, and become dust, which the horse inhales, sadly to his cost and value.

Neat Cattle.—Actual cost of rearing may be estimated variously, as they vary too greatly in size and value. As a general working price, it may be put at $12 at 3 years old, though to hire the work done would perhaps cost double that. Heifers generally become cows at from 2 to 3 years old; are worth from $15 to $20. Oxen, some of which girth 6½ to 7 feet, sell from $60 to $75 per pair—though some not improved in breed will not sell over $30 per pair. Cows in the fall (good seasons) are worth from $12 to $20; and in the spring, from $16 to $30; and so on for superior to $50, $75—even $100. Corn-meal is given to cattle for fattening at $1 per bushel, but not much, and this when beef thus fed is worth $4 per cwt. Various breeds of cattle are kept—the Durham, Devon, Hereford, Ayrshire, Galway, &c.—but no one keeps them separate; steers are trained variously. Some have sons who yoke them when young and break them; some put them into the team and they become docile; others yoke them (especially older persons) and let them run for days; then put them in the team.

Horses are grown to profit, as the price is very high. Horses could be kept from $7 to $15 per year, for the first 3 years; and I have hired them kept for $5 a few years ago. Horses, or colts, at three years and upwards, sell, according to quality, from $40 to $150, and so on to $200. Brood mares and colts are considered best off when least attended, only

to see them well fed and housed, but allowed to run loose, as convenient. Young horses are trained as easily by bitting first, then put into shafts, with nothing but wheels, and using as little coercive power as possible; very soon the poor fellow understands all that is required.

Mules are not reared in this vicinity. So many oxen are kept for lumbering they are crowded out.

Sheep.—Wool-growing, with the increase of the flock, is as good stock as any for profit. Twenty-five cents is the minimum price for wool, but sheep had better be kept when it occasionally runs below that. Wool is generally from 28 to 45 cents. A ton of hay will winter from 4 to 5 sheep, unless the winter is long, as they eat hay far less time than other stock. Some say six sheep equal a cow, at 2 tons or over—*too high*. Sheep are large or small, according as they are kept, and the wool decides the profit. The large coarse-woolled sheep are hardier than the small fine-woolled. Much may be said on sheep-raising, but it is unnecessary. Sheep should be kept well in winter, and in good pasturage in summer. Then separate the lambs from the ewes in September, or sooner; keep the lambs from yeaning the first year; and good flocks may be kept without "running out." Merino wool may cost two cents more on the pound than coarse—not more—for the Merino gives a little heavier fleece for his bigness. Sheep, well kept, will save over three-fourths of their young, without twins; but great carelessness is often observed at a high cost—should have sods where they can get them in long snowy winters.

Hogs.—The best breed is hardly found. A great exertion has been made to obtain the best breeds, but in crossing little attention is paid, and the best breed is unknown. A cross, however, somewhat prevalent, is as good as to be expected. Much is lost by breeding "in and in." As to the cheapest method of making pork various opinions exist. Between keeping a pig over winter and killing a hog, or fattening a pig and killing a shoat, I think a pig will eat (from the first of June to killing time) a much as will fatten a hog. Then, if 400 pounds of pork against 200 or 250 pounds will pay for wintering a shoat, that is as well, or better—the pork is better. A bushel of corn will make pork enough to bring it to 8 cents the pound. Pork is salted by judgment and not by rule; cut in strips, well packed, covered with salt thoroughly, and so on; put in a little saltpetre. Bacon is better cured South and West than here, though we have good.

Cotton is not raised, but worn abundantly.

Cane, none—*rice*, same—*tobacco*, same—though formerly it was considerable; is used enormously.

Hemp—not raised—has been tried, but not liked.

Roots.—Crops increasing fast, and found profitable in our cold climate to feed out with hay and other fodder for stock of all kinds. Carrots are best liked for horses; worth $2 50 and over per bushel—sold by the ton. Rutabaga and mangel-wurzel found good for pork-raising, given with barley meal. Land prepared as for corn—the poorer will do; manure in drills, or holes, for hills. Seeding done by hand, or, far better, by a seed-sower; product not known—about from 500 to 1,000 bushels to the acre.

Potatoes.—The yield per acre, twenty years ago, was from 200 to 300 bushels, but more recently the blight has made such havoc that farmers have been glad to get enough which would keep through the winter for home consumption and for seeding. Not much improvement was realized till this year; yield this year, from 100 to 200 bushels of firstrate potatoes; cost of raising, about from 15 to 20 cents. It is hoped that the trouble is over, and wheat and potatoes are destined to take rank again among the profitable crops of Maine. The best kinds for a crop are the white, pink-eye, and the peach-blow; and these are all good table varieties. The blue and the white Christie, the Butman, the lady's finger, and the Carney, are good table varieties, but need much richer ground. As yet, perhaps, potatoes should not be manured much, as they are more likely to rot on manured land. The best way is to plant on good healthy soil, about 3½ feet by 2½ or 3 feet apart; I prefer 3. Hoe once or twice, but all before the tubers form.

Fruits.—Much more attention paid than formerly; grafting is very common, and many varieties are sent to market, and a fair business will be done as soon as we have a railroad.

Apples are a profitable crop when there is a market; but apples and most of the fruits are raised by every one, and the market is too full. The value of apples for stock-feeding is not known here, and thousands of bushels of apples have been nearly wasted this year, which the farmers could not be persuaded to pick and store for cattle and hogs, although fodder is very scarce on account of drought. It is believed that good fair apples are worth about as much as potatoes; mixed, the proportion of one part apples to two of potatoes, quite as good as all potatoes. Hogs have fattened on raw apples this year. The blight on apple-trees is seldom seen. Pears and peaches are not cultivated to much extent. Gypsum thrown on or about fruit-trees is very good, to keep them lively and prevent casting fruit. Grafting, budding, &c., I am not personally conversant with.

Manures.—Manures should be piled under cover, and covered with earth or leeched ashes. Much is done with swamp-mud, and many other materials, but none of them succeed to the best profit without some process of fermentation, as Bommer's plan, or some other. Lime and plaster have done well, but farmers in general lack faith, because it does not show its effects immediately. The geological features of Maine, more especially the northern part, present a great variety of soil, distinctly marked. Appearances go far in justification of the belief that the whole country has been flooded by some revolutions of nature, and that the waters of the western lakes have been precipitated over the whole face of Northern Maine, from the Highlands to the Gulf of St. Lawrence, and all along the seaboard. Consequently, we have very little vegetable mould; and while Canada West and territory beyond the lakes have from one to three feet of vegetable mould, we have not more than double that of inches. Thus, we have sand-hills and clay-fields, and seldom one without the other. This is beginning to attract the attention of the farmer, and several highly remunerating experiments have been made of mixing soils. Clay to sand, and sand to clay, will, eventually, do much to supply the place of manure; and the trial will, I think, far transcend the most sanguine expectations.

The crops have been very good this season, and had it not been dry in summer, would have been unusually productive. Wheat is good, as also corn, rye, barley, oats, peas, beans, &c. Turnips were injured by the worms this year and last, which may be prevented by putting a little fine salt at the roots, though attended with labor; dipping the roots in salt when set will help them. Wild fruits abundant, and apples as plenty as *advice*—had for packing, in any quantity; many thousand bushels wasted on the ground.

With respectful esteem, yours truly,

EUSEBIUS WESTON.

To the COMMISSIONER OF PATENTS.

NEW SHARON, FRANKLIN COUNTY, MAINE,
12th mo., 4th, 1852.

SIR: Thy Circular, under date of 8th mo., 1852, was duly received, and in compliance with the request contained therein, I forward the following particulars, viz:

Wheat.—Average product per acre, eighteen bushels. Time of seeding, on or near the twentieth of fifth month. Time of harvesting, about the twentieth of ninth month. Seed prepared by washing in pickle and mixing with a small amount of lime.

Plough once in the fall, about eight inches, and use the cultivator to mellow it in the spring. Yield per acre upon the increase. System of rotation: oats, corn, or potatoes, and wheat. Remedies for Hessian flies and weevils: late sowing, and lime and ashes sown broadcast when the wheat has attained a growth of six inches. Average price in our market, one dollar. Grass seeds, Timothy, and clover mixed and sown with the wheat.

Corn.—Average product per acre, thirty bushels; cost of producing per bushel, fifty cents. Best system of culture: green manure, ploughed under in the fall, and old manure put in the hill to give the crop an early start. Hoed twice or three times, according to the season. Best method of feeding, ground and cooked. Method of preparing soil, ploughing in fall and again in the spring, and harrowing fine. Rows three feet and a half distant, stalks three feet.

Oats.—Average yield per acre, twenty bushels. Quantity of seed, two and a half to three bushels per acre.

Barley.—Do not raise it. *Rye*—ditto.

Peas.—Planted with potatoes, four in a hill. Average yield per acre, five bushels. Not cultivated for renovation of land. Beans with corn between the hills, five in each hill; average yield, seven to eight bushels per acre.

Clover and Grasses.—Average yield per acre, usually about one ton. Quantity of seed used, eight pounds of clover and one peck of Timothy per acre. Have not experimented upon meadow land. Cost of production, four dollars per ton.

Dairy Husbandry.—Average yearly product per cow, one cwt. cheese and thirty pounds of butter.

Respectfully,

FREDERICK SWAN.

To the COMMISSIONER OF PATENTS.

PERRY, WASHINGTON COUNTY, MAINE,
January 26, 1853.

SIR: In reply to the Agricultural Circular, I will state only my own experience with a few of the subjects therein named. Wheat is not much cultivated, and no systematic experiments are within my knowledge as to the increased product from the use of guano. It is usually made to follow the potato or turnip crop, and seldom gets any manure other than what was applied to the previous crop. It is as sure as most crops, yielding on an average 15 bushels per acre, sown with Timothy, red clover, and fowl meadow grasses. Corn—we raise none.

Average yield of oats, fifty bushels upon pasture land or green-sward—of barley, thirty bushels. As to the cost of producing wool, I have found that, with any breeds we have here, a pound of fine Merino wool costs less than a pound of coarse wool. From some experiments in pork-raising (incomplete as yet) I am led to suppose that five pounds of grain are required to make a pound of pork.

In the cultivation of root crops, especially rutabaga, I have found guano the cheapest and best manure. I have tried it side by side with manure from the barn cellar and find it fully equal, at a cost not exceeding that of carting the manure when the transportation is a quarter of a mile.

Six hundred pounds applied to an acre gave eight hundred bushels rutabaga, where without it there probably would not have been two hundred; a few rows left without guano for comparison, gave nothing at all. The cultivation of this crop is increasing, but not so fast as it ought. Where we cannot raise corn, this may, to some degree, supply its place. Beef may be made to good advantage, two bushels a day to a fatting ox, and he will require but very little hay, and will fatten fast; a half bushel a day, with straw, for cows or young cattle, I find very well takes the place of hay; and for store-hogs, half a bushel to each, *fed raw*, will keep them in good condition.

Irish potatoes, our great staple, rot as bad as ever in most places, while some localities entirely escape.

Fruit is only beginning to receive attention; yet it may be made the most profitable crop of the country. Apples may be produced here *good enough*, as we have examples to show, and in sufficient quantity, to be a source of profit Plums succeed as well as anywhere; cherries also.

I consider the best method of grafting to be the following: Take up the tree at a year old, cut it off at the ground with a sloping cut an inch long; match the scion to it nicely, and tie with cotton wicking; put no wax or anything else around the splice, but set out immediately burying the splice two or three inches in the ground. This method performed as early as the young trees can be got up, will prove successful with apple, plum, or cherry, in most cases. I have some fine plums which are four years from a graft in the root, and bore fruit last year.

Manures.—I have not been able to perceive any beneficial effects from lime used in *any way*, or from plaster used alone; but mixed with guano in equal parts, I think it tends to retain the fertilizing principle, so that the crops get more of it.

Guano, at three hundred pounds per acre, gave a yield of potatoes equal to that given by twelve cords barn manure.

Respectfully,

WILLIAM D. DANA.

Average range of Thermometer, &c.

Date.	Temperature.	Snow.	Rain.	Remarks.
1852.	*Degrees.*	*Inches.*	*Inches.*	
January ...	20.5	18	8	
February ..	25.5	12	6	
March.....	29.2	18	3	
Ap	38.8	.....	10	Sleighing till 10th April from the 10th November—150 days.
May	50.1	.....	½	
June.....	53.6	.....	3	
July	65.4	.....	7	
August....	62.7	.....	7	
September .	56.3	.....	5	
October ...	44.2	.....	11	
November .	36.1	1	8	
December .	30.2	12	9	
1853.				
To Jan. 26	26	.....	4	

W. D. D.

WILTON, MAINE, *February 5*, 1853.

SIR I have been in the business of rearing and marketing mules for many years; which I have marketed principally in New Haven, Connecticut, and in the States of New Jersey and Pennsylvania; which animal, in the latter two States, is much in use, I sold mules there twenty-eight years ago last fall, which were two years old; and I saw some of them two years ago, which were fat; and the owners said they were as good as ever.

I have conversed with many aged gentlemen, who have used mules for fifty years, and with some who then had mules in their possession which they represented to be forty-two years of age. I have been also told of one owned in Pennsylvania that was sixty-three years old. I am fully satisfied, from my own observation, that mules live to double the age of horses; that it costs but about one-half as much to keep them, and are not one-half so subject to disease; consequently, the saving would be great; and I think they ought to be used for draught in all countries, instead of horses.

Such complaints as heaves, spavin, &c., I have never yet seen or heard of about a mule; and I have raised hundreds and seen thousands; which complaints are very prevalent among horses.

I give it as my opinion, that the average age of mules is thirty-five or forty years. They are much easier broken than horses, if treated with kindness.

It is true, there seems to be a general prejudice existing with people against this animal; and it is expected that they will kick or kill everybody who has much to do with them; and when people undertake to break

them, it is thought to be the first requisite to tie them up and give them a sound drubbing, not for anything the innocent creatures have done, but for something they are expected to do; and being animals that are intelligent, they rightly become dissatisfied with such treatment, and, of course, will show resentment. While engaged in selling, I have helped harness up a great many taken from the drove, without any previous training, and have driven them in a wagon containing several persons besides myself, and I never saw one contrary or refuse to go off immediately. They are much more intelligent and tractable than horses, and their attachment is much stronger, if well treated. The foal is carried easier by the mare, and reduces her less, both before and after birth.

They can always be sold for ready cash at the South; and, taking them on an average, and at any age, will bring more money here at the North than horses.

Therefore, I invite my fellow-farmers to examine this subject, and take a greater interest in rearing mules. They are a cash article, and a very useful and profitable animal; and it would save the North millions of dollars were they in as common use here as at the South.

The mule is adapted to labor at a younger age than the horse; and experience is all that is wanting to convince the people of the North of the great advantages that would accrue from bringing these animals into general use at home, and from rearing them more abundantly for the Southern markets.

S. SMITH.

RUTLAND, RUTLAND COUNTY, VT.,
December, 1852.

SIR: I had the honor of receiving the Circular from the Patent Office, through the politeness of Hon. S. Foot, and take this opportunity to reply as far as I am able to the questions therein; and if by so doing I can add anything to the Agricultural Report forthcoming, and contribute my mite to the worthy cause of distributing, through the Patent Office Report, general agricultural information, I shall be recompensed.

Rutland county lies between 43° 18′ and 45° 50′ north latitude, and contains almost all varieties of soils, consisting of clays of all kinds. sands of all qualities, muck, hard-pan, alluvial loams, and slate, and a mixture of these in every possible way. Of rock, the limestone formation is predominant; marble quarries inexhaustible, from the fine, clear, white (fully equal to the Italian) to coarse grades, and of all colors; slate is found equal to any in the world, for writing, for roofing, and other purposes, not forgetting the soft white slate-pencil quarries; the hard head, the flint and rock of primitive formation. Of soils, there is the most of the loams; a mixture of loam and sand is the best soil for grains; clay is the best for grass if there is plenty of wet, and slate for wheat; yet all crops raised here are made to prosper often on every variety of soil. Of crops, hay is the most important, treble the value of all the rest. Good farmers so manage the land as to make it produce the greatest amount of hay; keeping stock is the main business. Corn is the next crop in importance; then oats; then Irish potatoes, peas, beans,

carrots, and turnips are raised in small quantities. We have an agricultural society that is in a prosperous condition, and through this I expect great benefit to the agriculturists of Rutland county. Horses, cattle, and sheep are improving, as are crops of grain and roots. Twenty five years have wrought a great change in the plough and all other farm implements, for the better. Many now plough deep and give thorough culture, and begin to understand that the greatest support on which they can depend is their manure. The idea has exploded that a farm can be cheated and robbed and continue to produce well—have much absorbed by the crops and but little returned; the cheat is the other way. Men that make and apply much manure to their soils, plough deeper and deeper, and give thorough culture, are generously rewarded by their crops, by the increase of the value of their lands, and by the additional means to make the soil still richer; while those that adopt the shallow ploughing, half cultivating, half or less manuring, slovenly skimming operation, are growing poorer; their crops and the value of their lands decreasing, and *they* ready to say, hard times, a hard life, and poor business to farm it; when at least they are merely apologies for husbandmen. One great fault of many of the Rutland county farmers is, that they have too much land—they have not the capital requisite to carry on thoroughly, nor stock of approved kinds, to fence, ditch, cultivate, manure, and improve their soils; but all the money they can scrape together must go to pay for land. Taking us altogether, our crops are increasing.

Wheat did well on almost all soils when first cleared of the primeval forests, and for years afterward, and until 25 or 30 years ago; it had been for years a crop, and, on the farmer's delivering his surplus at Troy, N. Y., lined his pockets with the ready cash. But then came a failure in the crops of both winter and spring varieties; and from that time to the present, but few have continued to try to raise it. Most kinds of seed that have been brought here from abroad have done well for a few years, and then would be attacked by the Hessian fly, the weevil, or the rust, and would then be discarded. There have been some favorite spots, however, that have always born good wheat. Mellow loams on elevated lands, in the bosom of the Green Mountains, generally of the spring varieties. About 10 years ago, a Black sea spring wheat was very productive and much raised, but it run out in a few years. Winter wheat is now in fashion—the white flint and a bearded wheat, brought from Michigan. It is sown from the 20th of August to the 20th of September. One way to prepare the ground is to take an old pasture, plough in June, (summer fallow,) plough again the last of August or fore-part of September, harrow fine, and sow with 1¼ to 2 bushels per acre. Harvest late in July or early in August; yield per acre, from 15 to 40 bushels—average 25 bushels. Another method is, to take a piece that has been in corn, and heavily manure on the sod and turn it under; the corn crop cut up and drawn off as soon as ripe enough, which is from the first to the middle of September. The ground is ploughed, harrowed fine, and the wheat sown. The seed is washed and soaked in strong brine 24 hours; then mixed with slacked lime, 4 quarts to the bushel, and then sown; the salt and lime kill the weevil and prevent smut.

Corn.—This is a sure crop. The best method is to take a piece that has been in grass from 5 to 8 years, manure with coarse manure and plough thoroughly, pass a heavy roller over it, then harrow until well pul-

verized; lay the off-rows both ways, 2 feet 10 inches to 3 feet apart, and plant 4 to 5 kernels in a hill; cover 1 inch deep with a hoe, if the soil is rather poor after ploughing; spread 20 loads of fine manure before harrowing; time for planting, from the 10th to the 25th of May. The nearer the ground is ploughed and fitted to the time of planting, the better. The ground is laid off with a marker that makes 3 or 4 rows at a time; they should be straight and cross each other at right angles. Seed is soaked 25 hours in saltpetre water, then rolled in plaster. When the corn is about 4 inches high, pass twice in a row each way, with horse and cultivator, and dress the hill with a hoe. The next hoeing is the latter part of June, before the tassals appear. Cultivate twice in a row one way, hoe as before, without raising much hill. Experience has shown that the level culture is the best for corn. At the first hoeing the corn is thinned to 3 or 4 stalks in a hill; after the second hoeing, the corn should cover the ground. By standing thick, it prevents the growth of weeds, and the corn will not succor; should any appear they should not be removed; they will bear some corn and make fodder. From the first to the middle of August, the corn will be sufficiently advanced to cut up at the ground and shocked to cure; the time may be known when to cut, as one half the husks have turned white. If the ground is to be sown, this is the time to remove the corn; it should be set on fresh earth to cure, never on grass. The kinds raised are all yellow, from 8 to 12 rowed ears, from 7 to 13 inches long; yield per acre of shelled corn, from 40 to 110 bushels; the average of mine for years has been over 80 bushels. The general average in the county is 50 bushels.

I consider the fodder well cured where the crop is 80 bushels, equal to 1½ ton of hay per acre, to feed cattle. We have a home market for corn and other grains; average price, 80 cents. I estimate the labor of cultivating, fitting the ground, and securing the crops, at 20 days' work for a man, at 75 cents; team, 3 days, at $1 50, exclusive of putting on the manure.

Oats are raised after corn or potatoes, weighing 32 pounds to the bushel. They are considered exhausting, but furnish a large amount of straw, to be again converted into manure. They are excellent grain for all kinds of stock—particularly such as give milk—and are thought to be a profitable crop. Seed 3 to 3½ bushels per acre, sown without preparation; yield, about the same as corn when sown on good land—40 cents per bushel. Irish potatoes are raised of many varieties; land fitted similar to corn-land if manured after ploughing. The manure should be fine and well mixed with the soil. Run a one-horse plough 3 inches deep one way for the rows; mark the other way with the marker. The seed should not be smaller than medium size; by cutting, it will take less to seed an acre. I plant from 16 to 25 bushels; rows 2 feet 10 inches each way; cultivate and hoe as for corn, without raising much hill; drop a large table-spoonful of plaster on the hill before covering; cover 1 inch deep with a hoe; plant from the 5th to the 25th of May; dig the last half of September, or dig early; yield, from 150 to 300 bushels to the acre. Since the potato rot has been in the country, which is 6 years—potatoes are not affected by the rot—this year I have lost but a very few by the rot when planted on warm dry land, or on corn land; but the yield by the acre has diminished. This year the yield will compare with the yield when the potato was healthy.

Rye is raised on light, sandy soils without manure; average price, 75 cents; yield per acre, 15 bushels; sown at the same time as winter wheat; seed per acre, $1\frac{1}{4}$ to $1\frac{1}{2}$ bushel. White beans, on similar soils, yield per acre 20 bushels; price, $1 50. Buckwheat is raised on the poorest soils; buckwheat is said to make excellent warm cakes, and is good to fatten hogs. I am unable to state the yield or price.

Carrots have been raised by many since visited by the potato rot, but the seed is uncertain to germinate. We often fail to get a good stand of plants; but when we do, the yield is from 400 to 700 bushels. The great expense of cultivating necessary—extending through the middle of summer, and the high price of labor—from $10 to $15 per month, and boarded, make it discouraging to raise this root. I consider them of more value for feeding than potatoes; but I can cultivate four acres of corn with less labor than one of carrots. Turnips, both English and Swedish, are occasionally raised, and produce from 40 to 800 bushels to the acre. The mode of cultivation and rotation of crops of our best farmers on strong soils, is this: Make the soil produce the greatest amount of hay, and grain, and roots, for their own consumption. When good land has been in grass from 5 to 7 years, manure on the sod and plough under, and plant with corn or potatoes; give them thorough cultivation; then sow wheat or oats, and seed down with 12 quarts of herdsgrass and 3 quarts of clover seed to the acre. The grass is sown before the last harrowing; then roll with a heavy roller. This mashes all lumps and leaves the ground smooth for mowing, and the seed comes up better. When this has been in grass 2 or 3 years, it needs a top-dressing of fine manure, leached ashes, &c.—10 loads to the acre. Sow plaster occasionally, or once in two years—100 to 150 to the acre. To obtain large crops, the soil in grass or grain needs to be manured once in three years. If a farm has a muck bed near, it is a mine of wealth to enrich the soil; litter the stables, sheds, and yards with it; make hogs work it; they will make manure enough, if rightly managed, to pay half their keeping. Have a basin to receive the wash from barn-yards; fill this with muck and animal or vegetable substance. In this way, we have a manure to give each acre its quota once in three years. On heavy soils that are unfit for corn, when the grass has become light, and they can be turned flat with the plough, do so any time from hay-time until winter; pass the roller over it, give it 10 loads of fine manure to the acre, (manufactured muck is the best;) harrow until well pulverized. When this is done, if it is past the middle of September, let it lie until it has become sufficiently dry in the spring; then sow grass seed, harrow, and roll; and about the middle of August, cut 3 tons of tender, excellent hay to the acre. If sown in the fall, omit the clover-seed, and sow the latter part of March. By this management, expending all hay, straw, and corn fodder on the farm, using and mixing other materials with it, we make a large quantity of manure; the soil is increasing in productiveness, and consequently in value. But should any that have not tested this course ask us what we had to sell? The answer is, our horses—from $75 to $500 each. The most approved breeds at the present are the Morgans and the Black Hawks—they are not excelled by any in the States. Our fat oxen, cows, steers, and heifers, for the Boston and the home markets, at from $4 to $7 50 per hundred. Pairs of fat oxen bring from $100 to $200. Our large annual clip of Spanish Merino and Saxon wool, at an

average price of 40 cents per pound. Our surplus sheep find a ready market. Our pork, for home consumption, average price, 6¼ cents per pound. Our butter, average price, 18 cents; cheese, 6¼ cents. Our apples, both whole and dried, 50 cents per bushel, or 6 cents per pound when dried; and potatoes and white beans bring high prices. Dairies, when well managed, make from $30 to $40 worth per cow. Fair cows in the spring are worth $30; some extra ones sell as high as $60. The Rutland county farmers admire red, close-made, fine-haired cattle; and but little foreign breeds are crossed on our natives except the Devon. The Durhams are bad-colored, too large, and require too high feed to make them a favorite breed with us. It makes but little difference what breed you feed a given amount of food to make beef, if it possesses a quiet disposition, a loose mellow hide, and has the fattening properties. Our cattle and sheep get the most of their fat on grass, and are then fed with grain and roots. Corn is generally ground for horses and cattle with the cob; for hogs it is best without the cob. Fed without cooking, by being wet up with slops from the house, or water. Meal would undoubtedly make more pork cooked; but it is some labor, and is not often done without it is fed to a *crack* pig to beat one's neighbor. Three hundred to four hundred pounds, dressed weight, is not very uncommon for such pigs at nine months old. In raising all kinds of stock, keep well until three months old. After that, it is hard work to stunt them; but if they have been pinched before that time, it is rare that they outgrow it. Those that feed well raise cattle that dress 500 pounds average weight at two years old; while the average weight of the skinning farmer's cattle is 450 pounds. Our winters in this latitude, or foddering season, last full one half of the year. Working horses and cattle need stabling seven months; cows, to be fed on dry fodder six to seven. Colts, young cattle, and sheep, five to six months. All stock should have good shelter stables and sheds through the foddering season. They thrive better, consume less food, and the extra price that the manure is worth alone, such as is exposed and leached, will soon pay for the erection of sheds and stables. One hundred sheep will consume from 17 to 20 tons of good hay in the foddering season; fifteen bushels of corn, or thirty bushels of oats, besides roots and provender, for breeding ewes. Breeding ewes, when well managed, from three to seven years of age, will raise 90 per cent. of their lambs. Good flocks shear, washed on the sheep, four to five pounds of wool; on the Saxon, three pounds; the Saxon and Merino, four pounds; and the Spanish Merino, five pounds of wool. The prices at which it sells makes the Merino the most profitable. Average price of hay, $7. Twenty-five acres of good pasture will summer 100 sheep; but if ordinary, it is not sufficient. Give all stock all the salt they will eat at all times of the year; it keeps them healthy. Mix ground sulphur with the salt for sheep; it will keep off disease, and if exposed to the foot rot, and not an entire preventive, a less number will be affected, and it will work with less virulence. It would be a poor business to grow wool here for less than 40 cents per pound. In our county there is a large amount of interval meadow lying on the banks of the streams; the overflow of the streams in high water keeps them fertile. These lands that lie low are never ploughed, but produce a crop of hay annually of interval and good upland, two tons per acre at one crop. Hay is cut from

the 1st of July to the 1st of September. The after-crop of grass is fed off by stock late in the season.

Rutland county raises one tenth of its wheat, nine tenths of corn and oats consumed, and pork equal to its own consumption. The workmen and teams on our railroads, railroad depôts, marble quarries, marble mills, iron furnaces, slate and slate-pencil quarries, and manufactories, make a large home market for our surplus products. A majority of our farms have their maple-sugar orchards. Sugar is made from the sap of this tree. The most approved method is, to boil in shallow sheet iron pans, set on arches in a sugar-house. The fire comes in contact only with the bottom, which must be covered with sap when over the fire. Three-fourths of a cord of wood, of any description, if dry, will boil to sirup enough for one hundred pounds of sugar. The manufacture of sugar is a simple process. To make good white sugar, keep all the apparatus perfectly sweet and clean; the quicker the sap is boiled to sirup the better; take it off the fire, and put it in wooden tubs, to cool and settle over night; then pour off all but the sediings; strain through a fine cloth strainer into a brass kettle, and put it over the fire. The fire should only come to the bottom of the kettle; this prevents burning on the sides of the kettle. The natural color of sugar is white, and if kept clean in the manufacture, and not burned, it will be perfectly white. Add to the sirup, when warming, two eggs well beaten, and one pint of new milk, which is sufficient for fifty pounds; skim well just before it comes to the boiling point; then boil to tub sugar; put it in wooden tubs; let it stand a few days, until the grain has done forming; start the plug in the bottom of the tub and let the molasses drain off; keep a wet cloth on the top of the sugar while draining; and the operation is done. Sugar is made this way equal in color and whiteness to double refined loaf sugar. For most families, it is preferred without draining. Sugar made this way is free from the rank, nauseous smell of cane brown sugar. The sap of the maple varies in sweetness. Two and a half to four gallons will make one pound of sugar.

Fruit.—Little is raised here except apples. The first settlers planted a generous supply of trees; and until about 18 years ago, there was an abundance of apples; since that, death and decay have nearly done up the old orchards, except in moist, elevated, and rocky locations, where they are yet thrifty. For the last ten years, the attention of the husbandman has been called to the subject, and a large amount of young trees have been planted. Pears, grapes, and many kinds of plums, cherries, and strawberries are cultivated by few with success. The past year has been a very peculiar one. November 7th, 1851, cold weather and good sleighing commenced; all stock came to fodder; snow laid until late in March. The spring was cold and wet up to the 5th of May. This was the first day that my soil was dry enough to start the plough, and grass began to start. Apple trees were not full in the bloom until the 7th of June; from that time until the 1st of September, but a small quantity of rain fell. It was what might be called a dry season. The eastern part of Rutland county will stand the drought better than any other section with which I am acquainted; but here the grass suffered severely. The hay crop was from one-fourth to one-third short; other crops proved good. The present prices of hay, grain, butter, cheese, and pork are from 20

to 100 per cent above the usual prices, caused mostly by the severe drought of last season.

Swine.—Most of the breeds in the States (except the western pointer) have been introduced here within the last thirty years, and crossed and mixed in every way, so that no one breed, or a cross between two, is distinct. There is a kind now in favor, called the Belgo, undoubtedly a cross of other breeds, that is a well built and well proportioned animal; and it is my opinion that our farmers' swine are equal to those of any other community.

Respectfully, yours,

H. W. LESTER.

Hon. S. H. Hodges,
Commissioner of Patents.

Springfield, Vermont,
December 28, 1852.

Sir: In reply to the Circular of the Patent Office, received last August, I shall confine my remarks to one inquiry—that of "sheep and wool," having in recent numbers of the Reports gone somewhat into detail in answering these inquiries, so far as Vermont is concerned, in my ordinary manner, according with my judgment and experience.

Wool-growing is profitable here whenever the price does not fall below 40 cents per pound; yet the amount of profit depends greatly upon the perfection of the flock for wool growing purposes, the skill and management of the grower, and the adaptation of the constitution of the animal to our climate. It costs as much to grow a pound of coarse wool as it does of fine Merino, though the carcass of the coarse-woolled sheep may be turned to better account for mutton; but on the whole the kind of sheep which will afford the most profit in the hands of a judicious and an experienced farmer is the thick, close, compact fleeced Spanish Merino. This is a docile and hardy race, producing as much fine wool for a given amount of feed as any other kinds; and the wethers or castrated males, at four and five years old, either from the pasture in the autumn or from the stalls in the winter and spring, are not slow for mutton purposes. This breed of sheep is comparatively small, and by a law of nature which cannot be set at naught, will consume no more food in proportion to their weight than the larger breeds, though they carry a much heavier fleece proportionably than the coarse or long-woolled kinds; with ordinary care, three-fourths as many lambs as ewes in the flock, designed for breeding, can be annually reared, and with extra care and attention the number can be increased up to a lamb for each ewe, though it should be an undeviating rule not to allow ewes to yean until they are three years old; having then attained size, strength, and vigor, they will impart this essential—a good constitution—to their young provided the sire be right; and here let me say that too much care cannot be taken in selecting the sire; a careful discrimination should be exercised, and none should be used but such as are perfect in fleece, both as to quantity and quality, also in form, strength, and vigor, as can be found in the best Merino

flocks of our country. Betwixt the sire and dam no relationship or affinity of blood should be suffered to exist; it tends to weaken the constitution, engenders deformities, and reduces the weight of fleece A renewal of blood every three or four years, by an exchange of bucks from one good flock to another, is a great desideratum in progressing and improving with a high-bred flock. The keeping both summer and winter should be generous and uniform, not sufficient to produce a high degree of flesh unless the animal is designed for the butcher, but in a fair stock condition, conducive to health and to the uniformity of the staple of the fleece. In the winter season in this locality, and in all high latitudes, the Merinos should be kept in flocks not exceeding 150 in number, in enclosed yards with open sheds, having a southern or eastern exposure, with access to running water within the enclosure if possible; a box always supplied with clean pure salt, racks for feeding hay, and the sheds kept littered with straw for a bed. The *quantity* of hay per diem depends upon the *quality*, as the waste is less as the quality is better; two and a half pounds per day for each full-grown sheep, or two pounds for lambs or yearlings, is sufficient of *good hay;* or, what is better, two pounds per day, with a gill of corn or a half pint of oats, per head. Oats are better than corn for young sheep; both should be fed with care at first, or it may produce the scours and kill the animal.

I am aware that all sheep-owners and wool growers will not adopt my opinion as to the most profitable kinds. I have come to the conclusion, that the small sheep of the race I have described are the most profitable. In addition to the large coarse-woolled kinds, we have in this country the Saxon, French, and Prussian Merinos, which have originated from the Spanish; all these fine-woolled races possess a common origin, and it only shows what the workings of nature are when assisted by art. The Saxon desired the perfection of the fleece in *fineness of texture.* The Frenchman took the opposite extreme, and sought quantity of fleece: both attained their object. But in so doing, one weakened the constitution, and reduced the weight of fleece and growth of the animal; the other enlarged the growth of both animal and fleece, but, as a natural result, which could not be avoided, suffered a deterioration in the quality of the fleece. The Prussians, like many of us Americans, seem to have taken the middle ground, and have sought only to improve upon the original stock, so far as it could be done without detriment to *quantity*, *quality*, or vigor of bone and muscle. I have seen some fine specimens of all these races, and it yet remains to be determined whether an improvement may not be made by a cross one with another, or a mixture of all the races. I speak as regards this section only; to some localities the coarse mutton-sheep may be best adapted; and to others, the French and Saxon Merinos. Sheep husbandry has been a vast source of profit to Vermont, and will continue to be, unless the raw material should cease to be wanted, by a suspension of the woollen business in this country.

I notice a striking fact in the last Census report, in relation to the average weight of fleeces throughout the United States, for 1850. Vermont stands at the head of the list, giving an average weight of near $3\frac{3}{4}$ pounds per head on her one million of sheep; while the aggregate of the whole is less than $2\frac{1}{2}$ pounds.

Another fact speaks well for her sheep-husbandry. By a reference to the weekly reports of the Boston live-stock market, it may be seen that Vermont sends more sheep to that market than all the other New England States; and the same remark will apply to horses and cattle. Limited as her boundaries are, small in area, with an uneven and broken surface, and sparse population, she may well be proud of her position as an agricultural producing State. Nothing short of the skill, industry, enterprise, untiring energy, and intelligence of her people, could have made her what she is. None of her sons, if they would but think so, need seek the mines of California, the valleys of Oregon, or the fertile regions of the West, to acquire a competency.

Respectfully, yours,

J. W. COLBURN.

Hon. SILAS H. HODGES,
Commissioner of Patents.

MIDDLEBURY, VERMONT,
December 22, 1852.

SIR: In the spring of 1851 I made a visit to France, for the express purpose of a thorough examination of the best Merino sheep of that country. I was much interested in the government flock at Rambouillet. Every department was conducted with great skill and attention, by competent shepherds, who devoted their whole time in the feeding and management of the flocks. A doctor, even, is supported by the government to administer to their physical wants—one well skilled in the anatomy of animals.

The sheep are all numbered and registered in a book for that purpose, by the Director, so that the pedigree of every animal can be traced for several generations, giving the age of each sheep to a day, of the birth and death, and to whom sold, with the price and the quantity of wool shorn each year.

The ewes are numbered, by cutting notches in the ears, and the rams are marked upon the horns with hot irons, upon which the numbers are engraved. This flock has remained at Rambouillet since 1786. No sheep can be purchased from this flock, except at the annual public sale, which takes place in April or May each year—always on Sunday. Such animals as are considered not worthy to be preserved for breeders are consigned to the butcher.

Their lambs are allowed to drop in January; the rams, at one year old, are crowded to the highest point of fatness, to prepare them for the sale. The average live weight, as registered upon the books, of 50 rams, at 15 months old, was 186 pounds.

There are two or three private flocks in France, of equal purity of blood, which are superior in size to those of Rambouillet. These descended from another branch of the government flock, that started at Croissy, near Paris, at the same time, being one half of the original flock; presented by the Queen of Spain to the King of France. Jean Baptiste François Gilbert, of Vidderville, purchased at the first sale of

the produce of this flock, which took place at Croissy, in 1800, one ram and eight ewes. The ram was four years old, and weighed 125 pounds, and carried 12 pounds of wool. The ewes then averaged 9 pounds of wool in its pure, unwashed state. Mr. Gilbert was the principal purchaser at the annual sales till 1818, when the whole flock at Croissy was sold, at an average price of from 120 to 300 francs each. The blood of Mr. Gilbert's flock was renewed every few years by a selection of rams from the flock at Rambouillet. This, together with the occasional renewal of blood and superior skill in breeding, gave Mr. Gilbert's flock the advantage over the others.

After becoming fully convinced that the private flocks were superior to any other of the fine-woolled breeds, for size, symmetry, for the greatest production of superior wool, and for their propensity to put on fat, I resolved to make my purchases there.

There are three or four extraordinary flocks, which have attained their present popularity and perfection by the long-continued patience and skill of the breeders, who have, by degrees, reared them up to their present excellence, from the puny Spanish race as they stood in 1785, among the best flocks in Spain.

These successful breeders did not allow their ewes to drop their lambs until three years old, nor to use rams until they arrived at full maturity; selecting only those of the largest size and most perfect in their points, combining a superior quality of wool, as well as a great weight of fleece. It was by this method, faithfully carried out, that they could produce rams, at 18 months old, to weigh 225 pounds, and to impart to the several succeeding generations all that constitute a perfect Merino sheep. They are well fed the year round upon such hay, grasses, vegetables, and grain as would tend to produce the greatest amount of muscle, bone, and flesh; housing them through the winter in warm but ventilated stone barns; and careful to fold them at night and during tedious storms.

Many of the rams, at maturity, will weigh from 250 to 300 pounds, and estimated to shear from 18 to 28 pounds of wool at one clip.

It is from these most celebrated private flocks that I have made my selections, and imported, during the last two years, near six hundred, at great cost, preferring those animals that would produce the heaviest fleece of the finest quantity of Merino wool; making a voyage each year to select and to see to the shipments, at a cost which will not fall short of $50,000. I am at present an owner in the whole of, or a part interest in, about 500 ewes, old and young, and am supplying rams to be shipped into all ports of the United States.

A cross of these French Merinos upon the common flocks of our country, has been fully tested. The half bloods are not only improved in size and constitution, but the annual production of wool is increased from one to three pounds to each sheep; and in many flocks the quality is improved in fineness and length of staple.

My recent sales of unwashed wool have varied from thirty-three to thirty-five cents per pound. Washed fleece or pulled wool, of this quality, at present readily commands from 52 to 58 cents per pound.

Half blood wethers, at full maturity, must command from $8 to $15 per head, in a favorable market, by the lot.

Our minister at Paris, Hon. William C. Rives, is collecting statistical

information, visiting the different departments in France, to better enable him to give us a correct history of the agricultural interest of that country, including the best breeds of horses, cattle, and sheep. Such facts as may be of interest to us will be published in a book soon to be issued

Respectfully,

S. WRIGHT JEWETT.

CHESTER, WINDSOR COUNTY, VT.,
December 30, 1852.

DEAR SIR: Mr. Whitcomb (postmaster) has lately handed me your Circular of August, ultimo, requesting me to answer some of the inquiries made therein. I fear but very few persons will be benefited by the trifling amount of my experience.

Wheat.—Wheat is raised in small quantities in this section of country, and comparatively by very few farmers. When raised at all, it is raised upon high lands, much exposed to strong northwest winds. If sown upon our meadows or lowlands early enough to escape the rust, which is sure to strike late sown, the weevil will destroy it; and if sown late enough to escape the weevil, the rust will injure, if not destroy it.

Indian corn may well be said to be our great staple, whether considered as forage for stock or food for mankind. It requires much labor to cultivate it aright, and much manure to insure good crops; but I think it generally pays well for interest. The best method, according to my experience of cultivating, is to plough, deep and well, two or three times before planting, spread manure freely, and furrow in rows, each way, about three feet apart—I am well satisfied that corn will ear much better at that distance than when nearer; manure in the hill, with well-rotted or hog manure, (though, I doubt not, in very dry seasons it would be less likely to sustain damage by drought if the manure was all spread;) plant deep enough to prevent the corn from drying after it sprouts. Much labor is frequently lost by persons slighting in the process of covering the seed. As soon as the corn is large enough to be seen in rows, cultivate each way with a good cultivator, and then the labor of clearing the weeds from the hills is very slight. Keep the ground as nearly level as possible, without raising the hill even at the third hoeing. Never hoe after the tassel is in blossom. I do not use a plough in my corn-field after planting. My practice, for the last five years, has been to put 2 or 3 table-spoonfuls of tar and a small handful of salt into one gallon of water, boiling hot, into which I put four quarts of seed-corn, (selected from the field as soon as the husks begin to turn,) stir briskly about two minutes, then drain off the water and stir in as much plaster as will stick to the kernel, when it is ready for immediate planting. Care should be taken not to let it stand too long after this process before planting; if it becomes much dried it will not sprout so quick. I am not troubled at all with crows pulling it up; do not use any "*lines or scare-crows.*" In the spring of 1849 I planted a field of corn, prepared according to the above directions, excepting four rows upon one side of it. The crows pulled almost every hill of the four rows of unprepared,

and pulled some half dozen hills of the other, but did not eat it. Barnyard fowls will not eat it. The average quantity per acre here is about 60 bushels, though some fields produce more than that.

I think 100 pounds of butter about an average per cow. A neighbor of mine, who kept 12 cows in the summer of 1850, made 1,220 pounds of butter, besides the milk used in a family of seven, and raised 5 calves. The last season, which was remarkably dry, and feed short, he kept 8 cows; made from them 600 pounds of butter, and raised 8 calves. The same person raised 42 chickens, the past summer, which weighed, when dressed for market, 163 pounds, and sold at his door at 10 cents per pound—$16 30.

Hogs.—The Suffolk breed of hogs is decidedly the best for fattening to slaughter previous to one year of age, and make the best pork. A cross of the Suffolk and Middlesex is thought an improvement by many, as it increases their size. Pure blood Suffolk pigs will bring $10 per pair at 5 or 6 weeks old, while other kinds are sold from $3 to $5 per pair.

Your obedient servant,

PRESCOTT HEALD.

BERNE, WASHINGTON COUNTY, VT.,
September 20, 1852.

SIR: Your Circular is received, and I will endeavor to answer some of the inquiries contained in it very briefly.

Wheat is not raised here to any great extent, on account of the weevil, although on high land with an inclination to the north or west, we raise good crops. It does the best after corn, if the land is well fitted. Our usual method of preparing the land for corn is to give it a good top-dressing with green stable or yard manure—say twenty loads to the acre; then plough or harrow it in. We then furrow it three and a half feet apart, one way, and then drop manure—either manure drawn out in the fall or from the hog-pen—and put it two and a half feet apart in the furrows, a small shovelful to a hill. We then drop the corn, five kernels to the hill, and cover it two inches deep with the hoe. We plant from the 15th to the 20th of May, and get from fifty to one hundred bushels per acre—on an average, about sixty bushels. We get of wheat, on upland, fitted in this way, from fifteen to twenty bushels per acre, if sown the first of April; but wheat is so uncertain a crop that the farmers prefer raising oats, as land so fitted will yield from fifty to seventy-five bushels of oats per acre; and they are worth from thirty to forty cents per bushel, and wheat is worth but one dollar. The kinds of wheat raised are mostly Black Sea or tea wheat. I have raised for a number of years the golden straw. We have never used guano in this section. We use Timothy or herdsgrass mostly for seeding clover, and sow it when we do our wheat or oats. A peck to the acre is enough, and if the land is rich six quarts will do, and the first crop will be full half clover, carried on in the manure. There is but little barley raised here, and but few peas. Beans do well, but are not cultivated to any extent.

Dairy Business is carried on to a considerable extent in this vicinity, and is, perhaps, as profitable as any business in this section. An average amount of butter per cow is about one hundred and twenty-

five pounds, (but some yield double that amount,) and is worth, this season, from eighteen to twenty-five cents per pound. The average yield of cheese per cow is two hundred and fifty pounds, or double that of butter per cow, and the price is seven to nine cents per pound. It costs as much to make and take care of two pounds of cheese as it does of one pound of butter. Making butter is more profitable, and cheese is attended with less care when made. In setting milk for butter we use tin pans, from six to ten quarts, strain them as full as we can handle them, and set them in the milk room, in a cool part of the house, and let them stand from twenty-four to forty-eight hours, until the cream has risen. It is then skimmed off, and kept cool until it is churned. Some churn every day, and some but twice a week. The churn mostly in use here is the barrel churn, placed on legs, with a crank and floats attached to it, so that by turning the crank the floats keep the cream in motion, and it will come in from ten to twenty minutes. We then draw off the buttermilk and wash the butter in cold water until it is clear of buttermilk, and salt it with the best ground rock-salt, and work it with the hand; let it stand twenty-four hours, and then work it thoroughly again and put it down solid in a firkin made of spruce or fir that will hold from thirty to sixty pounds, (the firkin having been previously soaked in strong brine.) We then set it in a cool place until we send it to market. In this way we seldom have any hurt. An average price of butter and cheese, for three or four years past, has been sixteen cents for butter and seven for cheese; but this year butter is worth twenty cents, on an average, and cheese eight cents. The cost of raising neat cattle here, on account of our long winters, to three years old, is eighteen dollars, or all they will fetch at that age. Good cows are worth twenty-five to thirty dollars in the spring, and fifteen to twenty in the fall. For feeding beef cattle we use but little corn, but feed potatoes, turnips, and carrots. We think the native animal, with the same attention and care, will compare favorably with the Durham, Devon, or Hereford. Our mode of breaking steers to the yoke is to begin when they are calves; the boys have a small yoke, and yoke them occasionally, and soon learn them to do anything they require of them; so they are broken from the time they are six months old; and they never forget it. Horses are the most profitable stock we can raise, if we take pains to improve the stock. It will cost thirty dollars to raise one to three years old, and the average price at that age is not less than fifty dollars, and at five years old they are worth from seventy-five to one hundred and twenty-five dollars, and, in the latter case, double the cost of raising.

Sheep are profitable stock at the present prices of wool. There is but little difference in the cost of producing coarse or fine wool; we prefer the latter, as it brings the most money. The Merino has the heaviest fleece, yielding on an average four pounds per head. It is worth forty cents per pound; and the coarse-woolled sheep will yield about the same amount, worth one-fourth less. For mutton the large and coarse-woolled sheep is the best. The ewes will raise about sixty lambs to one hundred ewes on an average.

Hogs.—The breed most sought after here is a cross of the Suffolk and grass-fed, (so called.) They are peaceable and easily fattened, and very sweet and thick pork. Pigs seven to nine months old will weight when slaughtered, from two hundred and twenty-five to three hundred

and twenty-five pounds, and at eighteen months old five hundred pounds. We take all the bone and lean meat when we cut it up, and use fresh. The fat we pack in layers, in a barrel, putting salt (rock or Turk's island) on each layer, eight quarts to one hundred pounds; and after a few days we add pickle enough to cover it, and it will keep sweet for years.

Very respectfully, yours,

OSMAN DEWEY.

To the COMMISSIONER OF PATENTS.

WEST RUPERT, VERMONT.

Clover and Grasses.—The hay crop is of vital importance in this latitude—north 43° 15′. The average quantity cut per acre is about 1¼ ton, although the past season has not given over three-fourths of a ton to the acre in consequence of the drought.

The best and most durable fertilizer for our meadow sand pastures is a top-dressing of ashes. Gypsum is mostly used. Sheep manure is also used advantageously on meadows. Clover and Timothy are the principal grasses cultivated in this vicinity. About 8 quarts of Timothy and 6 pounds of clover-seed is the usual quantity sown per acre. Spear grass adds much to our meadows and pastures, although it is not cultivated. I have no experience to show that red clover is detrimental to horses.

Sheep and Wool.—As the verdure of grass extends to the very summit of our hills, they are well adapted to wool growing, and it is profitable.

A few facts in relation to wool-growing are conclusively settled, viz: That a fine staple of wool cannot be grown on a carcass that is suitable or profitable for the butcher; and second, all animals require food according to the live weight of their bodies.

The average weight of the improved Saxons is about 65 pounds, consequently the yearly expense of keeping Saxons is as follows: If fed with hay 150 days, 243 pounds, which, at $7 per ton, is 85 cents; pasturing 31 weeks, at 1¼ cent per week, is 39 cents; care, 6 cents, which foots up as follows:

Wintering	$0 85
Summering	39
Care	6
Making the expense of keeping a Saxon sheep one year	1 30

In return we receive—

2¾ pounds of wool, at 50 cents per pound, making	1 37½
Manure	6
Proportionate value of increase	60
	2 03
	1 30
	73

From which, when the expense of keeping is deducted, you have 73 cents profit on sheep, or making 1 pound of Saxon wool cost 26 cents.

Cost per pound of growing coarse or fine wool. A like quantity of food will produce an equal quantity of clean wool upon all sheep raised for the value of the fleece. It is therefore more lucrative business to the farmer to grow fine than coarse or common wool, in proportion as the fine exceeds the coarse in price.

Large or small sheep most profitable? The expense of rearing animals should always be taken into account. Small animals come to maturity with much less expense than large ones, and therefore they are more valuable. This is especially true of sheep. Small sheep are the most profitable, and particularly so for the fleece.

How much more does it cost to produce 1 pound of fine than of coarse or ordinary wool? It costs *less* because the food of the coarse sheep is converted into fat rather than into wool.

Proportion of lambs raised to the number of ewes is about four-fifths.

Respectfully,

JOSEPH PARKER.

MIDDLETOWN, NEWPORT CO., R. I.,
12th mo., 4th, 1852.

Corn.—Average yield, about 40 bushels per acre. Best system of culture is to spread a good coat of manure on the land and plough in, and another on the surface after ploughing, harrow, and then plant, about three feet apart each way, four or five seeds to a hill.

Barley.—Average yield—say 30 bushels; three bushels seed per acre; less exhausting than oats.

Oats.—Average yield, about 45 bushels; from three to four bushels seed per acre sown.

Hay.—Quantity per acre, average, about one ton; all animal manures good for meadow land generally, and ashes, for some lands, produce crops equal to any kind of manure; about a bushel of grass-seed sown per acre, of different kinds, mixed and sown together, varying the quantity of clover according as the soil is wet or dry, putting most on dry land. I do not think clover injurious to horses.

Horses raised here are not very profitable, unless of extra quality. The best way to break young horses, I consider, is, to begin with them when very young; almost as soon as foaled, to handle them, and to halter them, and accustom them to lead while quite small, and, as they increase in size and strength, accustom them to wear the harness, and to draw light carriages, and they will soon become very docile and tractable.

Sheep are raised here as much for the meat as the wool. The middle size thought best—say Southdown; the cost of raising a pound of Merino not much more than of coarse. About as many lambs as ewes are generally raised, and sometimes more.

Root-Crops considered on the increase; soil should be made fine and rich. Average crop, about 400 bushels per acre.

Potatoes, Irish, used to produce on an average 200 bushels per acre, but since the disease, much less. Best method of culture is to spread

the manure on the furrows, and harrow well before planting, and plant in rows about three feet apart.

Fruit culture is on the increase. I consider apples enough may be grown to make it profitable. The Rhode Island Greening best for winter use here. Apples are good to feed to hogs and cattle, but not so good as potatoes.

Manure.—I consider the best way to preserve it is to spread it on the soil as fast as it can be procured, when the state of the crops will admit. Lime and plaster not much used here, and, from my experience, not of much use on the soil of this island.

DAVID BUFFUM.

To the COMMISSIONER OF PATENTS.

MASON, HILLSBOROUGH COUNTY, N. H.,
December 26, 1852.

SIR: Having received a Circular from the Patent Office, I will answer some of your inquiries, as far as I may be able.

From a somewhat extensive examination, I am satisfied that the average crop of Indian corn will not equal the amount of thirty bushels to the acre, in this region, and I should presume the same of the crop throughout the State. There are occasionally instances of more than four times that amount. The cost of raising corn, where the expense of manures, cost of labor employed, interest on the valuation of land, and taxes on the land, are all included, cannot be much, if any, less than one dollar per bushel on the average of crops.

Guano is beginning to be used in the production of Indian corn. From a field which I examined last harvest, I gathered the following reliable and certain facts, namely, that an application of about one hundred weight to the acre increased the quantity of the crop to the amount of seventeen bushels and six quarts. The land was first well dressed with barn manure, which was spread and ploughed in. After the ground was furrowed, the guano was put in the hill. It was covered to about the depth of one inch with earth before the corn was dropped upon it.

The most common manner of cultivating corn is to use a field which has been worked on the preceding year, plough it two or three times in the spring, spread on manure and put it in the hill, and hoe it two or three times during the early part of summer. When it begins to ripen most farmers cut off the top stalks.

Some of the best fields of corn which I have seen in this State were upon ground which was broken up in the spring, manured well, and planted in rows about three and a half feet apart, and hills about two and a half feet, and a liberal top dressing of lime and ashes after planting, to hasten the decomposition of the vegetable matter; and, after a short time more, a good dressing of plaster of Paris. The field hoed about as is usually done, and the top stalks not cut off.

The average quantity of hay, I should think, was something less than a ton to the acre. The cost of growing hay, adding the interest on the value of land, taxes on the land, cost of manure to keep the earth from exhaustion, and the expense of labor, would be from six to eight dollars per ton.

Clover, to be free from danger to working horses or oxen, ought to be cut and wet with cold water.

There is an increased use of lime, plaster, and guano as fertilizers, and in most cases with good success and profit.

Respectfully, yours,

A. G. COMINGS.

HAVERHILL, GRAFTON COUNTY, N. H.,
January 14, 1853.

SIR: In accordance with your request, I will endeavor to give some information to the questions in the Circular sent me some time since.

Wheat.—This crop has been on the increase with us for the last few years. Spring wheat is the kind raised, and is generally sown as late as the 1st of June, as late sowing is considered the best preventive for Hessian flies and weevils. Average crop, 15 bushels per acre; price, $1 25. Kinds of grass-seed, 4 pounds clover and ¼ bushel Timothy sown with the wheat. Guano is not used with us at all.

Corn is our principal crop on our bottom lands. The ground is manured with from 10 to 15 cords per acre; which is well ploughed in and harrowed, and is then planted with Woodward's planter, generally in drills. Average crop, 50 bushels. Cost of production, from 25 to 30 cents per bushel; usually ground and fed raw. Rows 3 feet and spears 6 inches apart.

Oats, Barley, Rye, Peas, and Beans.—Oats, average crop from 30 to 60 bushels. Barley not raised. Rye, from 10 to 15. Peas and beans, from 15 to 20; peas least exhausting, but not used as a renovating crop.

Clover and Grasses.—Quantity of hay per acre 1½ ton. Best fertilizers, clover, and that with Timothy, at the rate of 4 pounds clover and ¼ bushel Timothy, is used for laying down meadows. Cost of growing hay, $4 per ton. I have no doubt but clover will give horses the heaves by over-feeding when they are not at work.

Dairy Husbandry.—I have been in the business some for the last 10 years, and find that cows without extra feed will average 150 pounds of butter, besides raising their calves. Cost of making butter, 2½ per pound. (For description of making, see my letter of last year.) The business has been good for the last year; average price of butter, 20 to 25 cents. Cheese, 9 cents.

Hogs.—We consider the Suffolk breed of hogs to be the best, and we think we can improve them by crossing with our natives. The cheapest way of raising pork is to keep just what your milk will feed till fall, and then feed with Indian meal, and you have good sweet pork. My method of curing hams is as follows: To 100 pounds meat, 4 gallons water, 8 pounds common salt, 2 ounces saltpetre, 2 pounds brown sugar, or molasses, if you prefer. In this pickle let them remain till you wish to smoke them, and you will find them equal to any.

Potatoes.—We think we can remedy, if not entirely escape, the rot in the potatoes by early planting. Our method for the last 2 or 3 years has been to plant in April, and at the time of planting we use a composition of plaster and ashes—say about 2 parts ashes and 1 plaster, at the rate of 8

bushels per acre, and we have not been troubled with the rot. We prefer breaking up old pastures for potatoes, and then the next year we are sure to get a good crop of wheat, as potatoes fix the ground in good shape for wheat.

HENRY MERRILL.

To the COMMISSIONER OF PATENTS.

RICHMOND, MASS., *January* 12, 1853.

SIR: Your Circular, making inquiries on agricultural progress, was duly received. As times and seasons have very much to do with the labors and products of the farm, you will permit me to say, in the outset, that the winter of 1851–'52 was one of very severe and uniform coldness. From November to March, we had scarcely the semblance of a thawy day. The snows which fell early in the season were the last to acknowledge the power of warmth, and to dissolve under its influence. The quantity of snow that fell during the winter was not so great as we often have; yet it remained unusually even, so that bare grounds and huge drifts were alike unknown. Winter but slightly relaxed its hold until nearly April; and the middle of that month, snow was full plenty enough for January. About the 20th of April, cold, heavy, northeast rains set in, which wasted the snow in the valleys, and on hills of moderate elevation, and removed the frost from the earth; but the ground, as must needs be after such rains, was cold, exceedingly wet, and in no condition for the plough or the harrow. The rainy season continued until about the 8th of May, when a drought—the long continued, wide-spread drought of 1852—set in, and continued, with but few slight showers, until the last of October.

During the continuance of this drought there were many atmospheric phenomena worthy of notice. It was not unusual—indeed, it was sometimes an every day occurrence—to see huge black clouds, bellowing thunder in fierce tones, and shooting lightning in frightful streaks, arising in the west and moving towards the zenith, promising to water the earth and give joy to all who feed upon bounties; but they most usually parted before coming in showering distance, and marched off, perhaps, after dispensing a few drops, to dissolve in thin air or water other lands or seas. So it must be seen that the earth became very dry, so that you might dig in common loamy soils two feet and find no more indications of moisture than at the surface; so, too, the lowlands. Swamps were dry; for all but the most enduring springs refused to let out their liquid treasures, and the streams ceased to flow. Yet the drought was not entirely uniform in the strength of its ravages. Some localities received more rain than others, and these were in the neighborhood of the highest mountains, and where they are huddled together most closely. After such a drought as we experienced the last year, it cannot be supposed that crops were so abundant, as though rains had been mingled with sunshine. The hay crop was probably diminished from one-fourth to one-third. The falling off was most visibly seen in old stocked and very recent stocked meadows. Those coming into mowing from the previous year's seeding-down were light; those in the second and third year from stocking were middling; and the quantity diminished as you went back

of the third year. Low lands gave a fair crop, and of improved quality. In so dry and pleasant a season, it will readily be supposed the hay was secured in fine order. This fact, with its superior quality, caused it to spend well, and heavy horses are much less common this winter than usual. Owing to the lateness of spring, but little ploughing was done until quite the last of April, and on many farms not until May. Fortunately it was so; for in consequence of this delay, most of the sown crops were not got in until the heaviest rains were past, and the earth was left in a lighter, more pliable condition, which enabled it the better to withstand the drought.

The oat crop was fair, from the perfect manner in which it was secured. The straw will do much towards lengthening out fodder. The current price of oats is fifty cents per bushel. Winter grain was well started before the dry season came on; consequently the crop suffered less than many others; an increased quantity was on the ground, mostly of rye.

The corn crop, in consequence of the lateness of the spring, and the dry weather that followed, was for a while considered a failure; it came forward, however, and did remarkably well, unless it were in particular localities, where the effects of the season were too severe for it. The fodder saved with care from corn-fields has helped much in this time of scarcity.

Wheat.—Less and less of it is sown each year. When oats are worth fifty cents a bushel, and corn seventy-five cents, and superfine flour can be bought for five and six dollars a barrel, a general opinion prevails that it is cheaper to raise the former and buy the latter than to run the risk of an uncertain wheat crop. Present profits may induce to this course; but taking the drainage of land resulting from the system into consideration, it looks like questionable economy.

Buckwheat was sown in as liberal quantities as usual, and paid well—being a full average crop. Its fine effects in cleansing land from weeds, by its great shady tops, and the pulverizing influence of its roots in the soil, are enough to recommend its culture on many lands, if there was no other consideration.

A farmer of my acquaintance recently bought a field so densely covered with hard hack, (potentilla,) that it looked like a barren waste. It was bought cheap, of course, for, with the incumbrance, it was worth but little. Early in the spring he commenced ploughing it with a stout team, which tore out the bushes, which, when properly dried, were burnt, and the ground sown to buckwheat. The avails of the crop more than paid for the labor, and he expects the next crop will more than pay for the land—thus giving him a good field at a cheap rate, besides beautifying and making productive one of the waste places of the earth. In two years more he will have a beautiful, clean sward, where, a year ago, the eye could only rest with pain. This is not a solitary instance; we have many such, where fields are being reclaimed and subdued to the production of less hardy crops by the influence of buckwheat.

The potato crop has, finally, once more, nearly survived the blight, rot, or whatever it may be called. We have heard very little complaint of rotten potatoes this year. The yield has been fair compared with it in olden time. The flavor of potatoes is excellent and healthful. Whether this fact goes, in any way, to show the disease to arise from fluctua-

tions in the atmosphere, aided by predisposing causes in soil and cultivation, which may be traced to atmospheric influence, we leave it for others to decide, without venturing an opinion, which might only call out from some theorist the exclamation that we knew nothing about it.

Sowed corn is coming into favor for the fodder it produces. The sward on a piece of run-out meadow is inverted, a coat of manure spread on, and a thorough harrowing is given. The crop is highly remunerative, and leaves the ground in a clean, light, good condition for a future crop. Care must be used in saving the fodder, which, if well cured, is valuable for any stock, but is excellent for milch cows.

Fruit.—The attention to fruit growing is increasing every year, as the adaptation of our soil and climate to the object is being developed. These have received a powerful influence through the exhibitions at horticultural meetings, where the facts have come out that Berkshire is admirably adapted to growing apples, pears, and cherries in any quantity, and peaches, plums, and grapes in comfortable supplies. The appearance of the black warts on plum-trees, for the last season, in immense quantities, may, perhaps, throw a damper on the cultivation of that fruit. There are, however, some choice varieties which have not yet been affected by it, and it may be they will escape.

In consequence of the light crop of fodder there was a great reduction of stock in the fall. Though some lots were sold cheap, yet, as a whole, the farmer has but little cause of complaint of prices. Fat cattle and sheep, though lower than a year ago, were in fair demand, and sold quick, and prices are advancing.

On the whole, taking all things into consideration, the farmer has but little, if any, cause to regret what may seem to have been the unfavorable character of the season. If the earth has not given her usual abundance, she has enjoyed a rest from which she will arise to brighter and more abundant harvests. The deep drought has operated on her soil to give it richness; and the leanness which has come over her has invited the farmer to consider in what way similar evils—if they are evils—can best be averted. And, first, he may learn that deep and thorough tillage are among the best preventives of loss from lack of rain. The deeper the soil, and the finer it is pulverized, the more readily and efficiently it will imbibe moisture from the earth beneath, and from the atmosphere, which is often humid when the clouds give no rain. Equal benefits result from lands so tilled in times of heavy rains. It is a known fact that deep soils soonest relieve themselves of superfluous moisture; hence we may conclude that they are best for preserving a uniform degree of humidity. Can it be wondered, then, that the advantages of deep ploughing or of subsoiling are yearly gaining more favor wherever their benefits have been tested?

Another specific remedy for drought, as we have seen fully illustrated the last season in gardens and with all hoed crops, is frequent stirring the land; keeping it open and loose with the plough or the hoe.

Garden vegetables, *corn*, and *potatoes*, dry as the season was, all uniformly, where well cultivated, did well. A friend remarked to me that he, for a long time, watered his garden; yet his productions did not come forward. He at length threw away his water-pot and took his hoe, and gave it vigorous action, when everything smiled under its influence.

Another fact, not a new one, but presented in a more forcible form, de-

veloped itself most conclusively, in consequence of the dryness of the season: Lands inclining to moisture should not be ploughed at all immediately after a heavy rain. In consequence of the lateness of the season, farmers did not wait to have the ground get so dry as they would otherwise have done. Such lands, when ploughed again in August, broke up in clods so hard that a wonder would arise how anything had grown from them. It also taught the fallacy of an old-established practice of ploughing head-lands first, and allowing the team, when turning at the ends, to trample over them. We saw an instance where, in August, such head-lands were reploughed, and were continuous blocks of earth as hard as bricks. No impression of a heavy harrow could pulverize them; then they remained hard, and worthless, deforming and cumbering the surface. But had the land remained unploughed and left to grass, how much worse would have been the predicament? A thin, sterile soil and meagre crops would have been standing memorials of an abusing system, until a better course suggested a remedy. Head-lands should be the last lands ploughed to leave them in the comfortable and productive condition that good management requires.

Yours, truly,

W. BACON.

MARSHFIELD, MASS., *May* 19, 1852.

SIR: If I did not misunderstand, you consented, as my friend, to signify to the Hon. Commissioner of Patents, (Mr. Ewbank,) that on receiving a Circular from his office, I would cheerfully endeavor to get together some raw material of this place; and, though, in consequence of the sterility of our soil and secluded locality, it must be barren of incidents, yet, through his Reports, the farmers of distant States have an easy and happy way of interchanging civilities, and of telling each other how they do; and may possibly help a little to consolidate our Union. I hope the cost of publishing these Reports will never be thought an unwise appropriation of public money; but lest I should not live to receive a Circular, I beg leave to trouble you with one thing now—and that is the fertilizing matter which may be concealed in the bottom of our rivers. I know of no river, overflowing its banks with any degree of moderation, which does not make them more productive; and yet, I suppose, this treasure is not the cause of such overflow. We know that the lands enclosed in the bends of our little rivers, backed up by tide water for a few hours, and then taking their regular course to the sea, are very productive. I should be glad to read the opinions of scientific men on this subject, through the Reports. I have thought an instrument could be made, (which, in consequence of my poverty of language, I must call spoon-bowl pincers,) which, in the hands of an ingenious man, with a gondola, and what I believe is commonly called a derric, might make rapid progress in examination.

ISAAC DINGLEY.

To the COMMISSIONER OF PATENTS.

MARSHFIELD, PLYMOUTH COUNTY, MASS.,
January 10, 1853.

SIR: Through the kindness of our great and good friend, the late Secretary of State, whose lips were "as the doors of a treasury," I have received your Agricultural Circular for 1852; and all the abatement I feel in the pleasure is, my inability to do it justice. I must not, however, contend with myself much about that, but *sorrow more* because I cannot compress my narrative into fewer words, and be less burdensome. Under this impression, I shall confine my remarks, unless it may be some of a general character, to a small space of territory, and not interfere with what may more properly belong to those who may hereafter be called upon to speak of the adjacent country.

This town, incorporated in 1642, has features somewhat eccentric; being settled around the outside, and as near the rivers as the land will permit, with her forest-ground mostly in the middle; and though facetiously dotted with

"Hill and valley,
Fountain and fresh shade,"

there is a general inclination to the southeast, with an elevation of about 150 feet from the sea, on the western border. The air is invigorating for all but consumptive constitutions, and is said to afford an agreeable place of rustication for the successful men of Boston.

But this is our bright side; we have to struggle on under marked disadvantages. In any of the three directions, we have to go quite through one town and into another, to do business by such means; this breaks up time, and is a sad draught on our energies.

Corn.—This article is raised in considerable quantities, though far below the consumption. There is an increased attention paid to preparing the ground; a few years ago, an average crop was not any over 20 bushels to the acre; now it may be set at 30, while some fields go as high as 50 or 60, and we hear of some that go much higher; but of these last I am not prepared to speak. We spread the manure on the ground before ploughing; plough mostly in the spring, seldom more than once, and harrow; then check with the skooter plough all the way from 3 to 4 feet, as opinion leads us, planting at the intersections.

Warping with stakes and twine will keep off crows; but tarring the seed, and then rolling in plaster, will secure it not only against crows, but blackbirds and hens, unless it shall be an unusual time in coming up; but quails, cat-birds, and squirrels are not always to be prevented in this way, as they will work later, and after the ground has taken the tar out of the corn. These I now feed as my friends; they are not great eaters; it is only to keep a little corn scattered in their haunts. Formerly I have threaded the corn with hair from the horse's mane, but have abandoned it as a species of barbarism, and shall not again resort to it till milder means have proved abortive.

To prevent the cut worms in ground kept for frequent cultivation, it is necessary to clear off corn stumps, or anything else they can find for protection from the frosts before winter, and they will be very likely to die. The wire worms appear to be a little different. I believe, though I am not quite certain, that they sink and remain below the frost during

the winter, living on themselves, and returning in the spring with renewed appetites; they will eat almost anything that can be eaten. The best way I know is to plant some short pieces of cobs with the corn, as they will busy themselves with the piths, and this will lessen their mischief; I wish some one, who can afford the time, would ferret this out, and let us know.

In planting, we must be governed somewhat by the season; but in South-eastern Massachusetts, in the first half of May, when the corn is well up, the skooter plough, or cultivator, should be used freely; some fields will do as well with twice hoeing as others will with three times. The cost of raising corn here cannot be much less than 50 cents per bushel, exclusive of land rent; this may be thought high; it is, however, in part owing to the diminished value of the stover in the neighborhood of so much coarse meadow hay. We may pass one half the value of the manure to succeeding crops, and until the growing of it is better understood on our land, this is all we can look for beyond the simple reward of our labor.

Rye.—Winter rye receives attention; it is a common way to sow, in August, about one bushel to the acre at the last hoeing of corn, to come as a rotation crop; it often rusts a little, and many choose to wait longer; there should be red-top grass-seed sowed with the rye; we know it makes a poor lay of land, but we cannot well do without it; for next, to the potato and the pudding, a bread made of rye and corn is the cheapest article of substantial food within our reach.

It is ripe about the middle of July, and is as sure a crop, of from 10 to 12 bushels per acre, as any we raise; and I think we need none from abroad.

Grasses.—Timothy, red top, and clover are sown sometimes in the spring with oats; but such seed is very likely to die on our light land by summer drought. A better way for us is to plough after the grain or grass crop is taken off, and sow about the first of September, six pounds of clover, one peck of Timothy, and two pecks of red-top, per acre; it needs to be new-laid oftener than where there is a deeper soil.

When first laid to grass, from one to one and-a-half ton of hay per acre is obtained; and, by hauling a few miles, can always be cashed to a profit. The cost of growing this article may be set at ten dollars per 2,000 pounds.

Dairy.—Good attention is paid to making butter, compared with our means; but it is sold, without being put into kegs, in the neighboring towns, while some little finds its way to Boston. The cost may be 15 cents, though sometimes a little more, and it sells to a good profit.

We call her a firstrate cow that can furnish milk to make a pound of butter per day by grass alone, in the best part of the season.

Neat Cattle.—The raising of cattle is now receiving a little more attention. Not long since we were overrun with the dregs of the Brighton market. Forty years ago we had a thick-meated breed, making strong oxen for their keeping, and good cows for the dairy; but at a later period the skilful drovers poured in upon us their *creeping things*, which would have been dear at almost any price, were it not that they helped wipe off our coarse meadow hay, and assisted in making some manure. It was, however, a poor speculation, as it induced us to sell our best calves, and made our cattle grow worse

Within a few years, the mistake had been discovered. Many are now crossed with the Durhams, and we are looking for favorable results, though I think it is questionable whether they will be able to combat a careless wintering so well as our former native breed.

Sheep and Wool.—The rearing of sheep is a branch of business in which I take great interest, and it is *very lamentable* that they are so much neglected. Since reading from gentlemen at the South, I am led to believe there is no one of these United States, or their territories, unless we except Massachusetts, which could not grow *wool* to clothe their present number of inhabitants, without much interfering with other pursuits; and I believe it is as yet unknown how we, who inhabit the earth above the tropics, can be comfortably and decently clothed without the sheep. I think we should not be disheartened because we cannot now compete successfully with the Australian wool of England; with all her dexterity she may have trouble with her gold, and fail to clothe us when we shall most need her assistance.

At the North, the manufacturers are glad to work wool into cloth, on a share; and if those at Columbus, Georgia, could do the same, our young friends in that region might clothe their laborers by such means, and keep a larger part of their capital in reserve for extended enterprise.

Good common wool, unwashed, costs us 25 cents per pound, and on this we can now make nothing; but our lambs can be kept till four months old for $1 25 per head, and on these we make a little profit; and this is not all: sheep will clear off briars, weeds, and other troublesome herbage from our pastures, which I look upon as no small affair.

We know dogs do sometimes make sad havoc. But gentlemen are now very good and kind to see that their hogs are properly cared for; and we are led to hope that the improvements at this time being made in the state of society will soon induce them to take a similar care of their dogs.

In my little way I have been able to raise nine tenths of my lambs; but *my sheep know my voice and they follow me.*

Hogs.—Some pork is made partly on the save-all principle, beyond the consumption of the place, but not enough to pay for the pigs brought in by the drovers. It is carried away in the shape of whole, butchered hogs; the only profit there is in this branch of industry, beyond our own wants, is their activity in making manure, which I will omit describing, as I should be very tedious.

Potatoes, Irish.—They can be grown at the rate of 200 bushels per acre—I mean if we could manage so as to measure them before they rot; but this is bad policy. We have already dug enough of the sorry fruits of trying to raise a large amount of them on a small piece of land; 100 bushels per acre is all we should seek after; this can be done at 20 cents per bushel, including land rent.

We plant the Chenangos, round reds, long Johns, and pink eyes, with a few early whites; they should be planted on ground which had been in some crop the year before, and made pretty rich; the ground should be ploughed rather deep, for common ploughing; *no manure should be spread;* the rows should be *full three* feet apart; some weak manure should be put in the hill; *all slaughter-house or barn-cellar manure should be avoided;* for while these, together with the rotting of grass roots, are in active operation when they are most needed to fill out ears of corn, they are equally so to fill the potatoes with water, and prepare them to rot.

Notwithstanding all the disasters which have befallen us with regard to this crop, we yet grow them in considerable quantities, both for home use and a market; but as this is no light affair with us, I may have something to say with regard to it under another head.

Fruit.—The culture of apples is now receiving increased attention; some years ago, orchards were suffered, and even encouraged, to run down, from a *strange philanthropy*, lest the juice of the apple would somehow find its way into alcohol; this was an unfortunate conclusion to arrive at. We can sell all the very good fruit we can raise in a raw state; the second quality we can dry; these find a market on board whale-ships, and are useful for all long voyages; and the refuse of these may be fed to the cattle, or boiled for the hogs.

Manures.—This is a highly important item in working our light land; all excremental substances which can be obtained are preserved, and we all have our little manure heap, of muck and collections. Great exertion is now made to procure help from the sea-shore; very little is suffered to be lost after landing on the beach; it is a good article, and will pay for hauling six miles.

A little plaster is used on very dry land, for potatoes, to a profit; but guano and lime we think too expensive; if it were not so, lime would undoubtedly be used for potatoes, as it is a great absorbent, and would do something to prevent the rot. And here I may say, the steady dry weather, in August and September, 1852, had a very favorable effect on such as were badly planted; it saved large quantities of them, which must, otherwise, have been worthless. I think we may feel much less anxiety for the future with regard to so valuable a production.

Under the head of fruit, an opinion is asked on the comparative value of apples and potatoes for feeding; and on this I think I can say a little with a good degree of confidence. The last fall, I fatted a cow mostly on these two articles; I gave her a bushel of apples in the evening, and half as many potatoes in the morning. I thought the feed was about equal; the cow did well, and the beef was good. I salted the principal part for my own table. But this opinion, I think, would not be good in all cases; if the potatoes should be dug in a green state, as many are, to prevent them from rotting—I mean before the hull has surrendered to the starch for safe-keeping—their nourishment would be less; and so it would be with the green apples. As I understand, the conclusion must be this: in a ripe state, the starch in the potato, and the sugar in the apple, form the leading properties, not only of nourishment, but protection; and I think if the potato has barely enough starch in it to prevent it from rotting, when ripe, its nourishment is double that of the apple.

Poultry.—Hens are receiving strict attention, and the eggs sold do much towards paying for the large amount of corn we have to buy; the necessary care falls much upon children and shoemakers, who need some exercise in the open air. The eggs cost about 10 cents per dozen, and we can always sell them to the peddlers, for the Boston market, at a profit.

Cranberries.—The vines are set in cold, wet land, which is good for but little else without powerful draining; where they have grown well, large profits have been made, and we have them in moderate quantities for a market.

It must be *exceedingly desirable* to know how far South this berry will flourish, for if present prices could be received for fifteen years to come, most of the swamps in Massachusetts could be cleared of bushes, and planted, with advantage to the owner; although it may be of *greater public utility* to know how far north the rice will flourish; for there can be but little difference of opinion that, when the United States shall be fully peopled, this article must be raised wherever it will grow to maturity.

Meadow Grass—by this I mean our grass growing under the influence of tide water—is always redundant for foraging purposes. Sixty years' remembrance furnishes me with but one season when hay made from this grass was not for sale in this place; but this year, it is thought it will be nearly all taken up.

Pursuits.—And here I need make an apology, and it must be this: without saying something under this head, our picture must look so sickly as to pain the beholder.

Box Boards.—We have four mills at work in sawing this article; they are not only used for boxes, but carriages, trunks, and furniture. There is a good profit made on them.

Lobsters.—This business has been followed twenty years, and is good; from 50,000 to 100,000 are taken annually. The pots are made of oak or ash, generally half round, with the meshes as large as they can be and prevent their escape; baited with any dead fish. They enter by a tunnel-nosed aperture, and are set with a buoy and sinker. The lobsters are sold to the smacks, for Boston, and peddlers for the interior, at a large advance.

Shoemaking.—This finds employment for a very considerable number of our active young men. The business is so profitable as to cause them to leave farming and engage in it. Their places we have to fill with lads from the "Emerald Island;" and a goodly number of them do very well.

Whortleberries.—These are ripe in the first half of August; they remain in a good state about a couple of weeks. The schools then have their vacations to accommodate this business, and we have known a little child to earn a change of light clothes in a few days, without assistance. Some near place of deposit is provided, from whence the peddlers take them to Boston.

Shoe and Needle-work.—Considerable employment is now found for ingenious women in preparing vamps of shoes, and in making various kinds of clothing. The business is moderately profitable, and commands quick returns.

I am aware the space, *if any*, which can be allowed me should not permit the speaking of individuals; and yet there is *one so* distinguished, and connected with so much that is lovely, and of good report, that this communication would suffer without it—I mean the Hon. Daniel Webster, who died at his residence, in this town, October 24, 1852. It is not as the fearless counsellor, the flowery orator, or the far-seeing statesman, that I have anything to say; this is not mine to do.

While the State has hesitated at the cost of a model farm, he has furnished one from his own pocket, where we may go and see and judge for ourselves, *without money and without price*, in what we may follow him and in what we may not. He has undoubtedly raised the credit of farm-

ing among us, and solved to a certainty that interesting problem, which more provisions can be raised within the town, when they cannot be procured to better advantage elsewhere. His urbanity was known to all; and his evening and morning greetings were carefully treasured up to festoon our household words, and help beguile our slothful hours away.

There is a society in this county, called the Plymouth County Agricultural Society, which has a meeting annually in October, and it is well attended, where premiums are awarded for the best cultivated farms, the best neat cattle, and for victorious specimens of handiwork; and it is a spur to the farming interest generally. But here I must stop—I have already said too much. If there is *anything* which will be useful to report, it is humbly offered.

Very respectfully, your farming servant,

ISAAC DINGLEY.

To the COMMISSIONER OF PATENTS.

GREENFIELD, MASS., *September* 24, 1852

SIR: With this I enclose a letter from Henry W. Clapp esq., of this place, giving the particulars of the most remarkable grass crop (a fraction less than six tons to the acre in two cuttings) of which I ever saw any authentic account. He is a gentleman of the highest character, and has been president of our County Agricultural Society. The grass was well cured, and the hay carefully weighed, and those who saw the grass on the ground were not astonished at the result of the weighing; as a well-attested case of remarkable yield, it is well entitled to your attention.

I am, very respectfully,

GEO. T. DAVIS.

To the COMMISSIONER OF PATENTS.

GREENFIELD, *September* 24, 1852.

SIR: The Hon. G. T. Davis, from Massachusetts, has handed me a Circular of yours for 1852, asking for answers to several agricultural inquiries.

I will confine myself to my personal experience with seven acres, and one hundred rods of land accurately surveyed and devoted to raising grass. Early in the fall of 1848, I spread thirty loads of horse manure to the acre, (each load containing thirty bushels,) when I ploughed the land with a four-ox team, beam deep, following every furrow with a subsoil plough with four other oxen; in July, 1849, I thoroughly harrowed the land, and ploughed again (without subsoiling) and seeded and bushed herdsgrass seed only; and in July, 1850, my first crop yielded 29 tons 497 pounds; my second crop, in September, 14 tons 97 pounds; making 43 tons 594 pounds. The land is light, loamy soil, and, previous to subsoil ploughing, never yielded four tons per acre, notwithstanding it had been equally highly manured years previous.

Respectfully, &c.,

HENRY W. CLAPP.

HADLEY, HAMPSHIRE COUNTY, MASS.,
December 27, 1852.

SIR: Some weeks since I received a Circular soliciting information upon topics connected with agriculture. If the following observations are of any value, they are at your disposal:

Wheat.—The production of this grain is on the increase; it is thought by many farmers to be almost as sure a crop as rye. In this vicinity it is but slightly affected by the depredations of insects of any kind. The injuries to which it is most liable are those resulting from smut and blast or blight. The former of these is generally prevented by soaking the seed before sowing in a strong brine for twelve hours, and then rolling in unslacked lime. A change of seed, also—getting that grown in the Western States—is deemed by some a good preventive.

We have no sure preventive of blast, but consider early sowing and proper draining of the land the best. Our average product for winter wheat is probably 20 bushels per acre. Thirty is not an uncommon crop, and 50 is sometimes obtained on new lands. We sow two bushels to the acre early in September, if possible, and harvest the latter part of July. Guano is not much used. The most common system of rotation here is corn, broom corn, or potatoes, one or two years, with manure; then rye, oats, or wheat, with grass seed; making a rotation of from four to six years. By far the greater part of the wheat grown in this section comes in after a hoed crop. An excellent preparation is to plough in the stalks of broom corn while they are yet green, after having taken off the brush, and covering them thoroughly. Sow upon the furrow and roll and harrow in the seed. The stalks act as under-drains through the winter and spring, and then afford nourishment for the wheat when it most needs it. In these cases, and in most others, we plough but once, and from six to nine inches deep.

The grass-seeds most commonly used are herdsgrass or Timothy, red-top, and white and red clover. They are usually sown upon the wheat or rye early in the spring, and harrowed in with a light harrow. Sometimes they are sown immediately after a fall of snow in the spring, but before the frost is out of the ground, and the harrowing omitted.

The price of wheat varies from $1 50 to $2 per bushel.

Cows.—One hundred and fifty pounds of butter per year is considered a fair yield for one cow, though 200 are sometimes obtained. But little cheese is made in this region. We think a temperature of sixty degrees the best for raising cream, and also for churning it, though the temperature must be varied somewhat as the weather changes. The milk is allowed to stand from 36 to 48 hours, and when the cream is taken off it is put into a tin vessel and slightly stirred whenever more cream is added.

The churn pretty generally used here is in the form of a cylinder with a dash hung horizontally, and revolving by means of a crank. The butter finds a market in the immediate vicinity, so that but little is packed into firkins. The average price is 18 or 20 cents.

Hogs.—A mixture of the Suffolk and Mackery breeds are most sought for; combining, as they do in a high degree, the two qualities of good size, with small bones, and great symmetry of form. It is thought best to have a kind that will come to maturity in a short time. Pigs are frequently killed at six and nine months old, and make as profitable a return

as any; they sometimes attain the weight of 350 pounds when dressed, in the latter space of time. Managed in this way they must be well fed the whole time.

Pork to be packed is cut into strips four or six inches wide and tightly packed in layers with one edge down and a layer of coarse salt sprinkled in between each layer. After the pork has stood two or three days, cold water is poured over the whole in quantity sufficient to cover it.

A receipt for curing hams, proved to be good, is the following: For 100 pounds meat, 6 pounds salt, 4 pounds sugar, 2 ounces saltpetre, 4 gallons water. Boil together and take of the scum, stand until cool before using. Let the meat be in the brine six weeks and smoke four.

Corn.—Guano is sometimes used with good effect in the production of this crop, either sown or put into hills. I should think the average product of corn would not vary much from 35 bushels per acre, costing 60 cents per bushel, estimating value of stalks at $5 per acre.

After thoroughly ploughing and harrowing the ground, it is marked off into rows both ways; the rows three feet apart. A composition of plaster, ashes, night soil, and manure from dove cots or hen roosts, and earth in the proportion of one-third of the whole, is dropped in quantities of a small handful to each hill. A good dressing for an acre is 100 pounds plaster, 5 bushels ashes, and other materials to make 10 bushels. This does not supersede the use of stable manure in all cases, but gives the plants a fine start. Four kernels are put into a hill and covered about an inch deep. When the corn is some three or four inches high, a cultivator is run between the rows both ways, and it is dressed with the hoe; this is repeated at intervals of a week or ten days, until the corn is so large as to cover the ground.

Most of the corn is ground before it is fed out to stock. For hogs it is sometimes partly cooked.

Manures.—The best method of making and preserving manures, or the one most in favor in this part of the State, is the following: A lean-to is erected over the stable window, out of which the manure is thrown. This protects it from the weather, and, at the same time, affords a shelter for the cattle when they are not in the barn. Corn-stalks, sometimes cut into pieces a foot long, are much used for litter, and for augmenting the manure heap. Stable manure is frequently mixed with muck in the proportion of 1 load of the former to 2 of the latter. The muck should be dug 9 months or a year before it is applied to the land. If the compost is to be used in the spring, it is best to dig the muck the summer before, and work in the manure well in the fall. A compost made in this way is as valuable, load for load, as common barn-yard manure. When stable manure is not to be had, the muck may be made available by mixing with 50 loads of muck and 50 bushels of ashes, 100 pounds of saltpetre and 500 pounds of plaster; the whole to lie some weeks until heat is evolved. Lime and plaster are used as fertilizers; the latter in large quantities. It is applied every year at the rate of 100 bushels per acre. It is sown upon pastures and mown in the spring; and also dropped into the hills of corn before planting. Shelled lime from New Haven, Connecticut, was used here for the first time last season. In one instance it was applied in the hill, in connexion with salt, in small quantities, by the advice of the late Professor Norton, who had previously analyzed the soil, and with a very favorable result, in-

creasing the crop, in the estimation of good judges, one third. For other crops, also, it has proved beneficial, though I have no particular facts to present. When sown, it has been at the rate of 20 bushels per acre.

Most respectfully, yours,

THEODORE G. HUNTINGTON.

WAREHAM, MASS., *August* 31, 1852.

SIR: Your Agricultural Circular is before me, and I have ventured to make the following hints in reply:

Wheat.—When the legislature of Massachusetts offered a bounty on wheat, many of her farmers appropriated their best land and manure to the raising of this article. In most cases they failed to get more than half a crop; which soon convinced the farmers (not the legislature) that it was better for a Massachusetts farmer to raise something else, and let New York and Ohio raise wheat, as heretofore. Had the time and money lost on the experiment been put into railroads, connecting this State with the wheat-growing States, the result would have been more beneficial to all parties concerned.

Corn.—In Massachusetts first set as stiff a grass sward upon your land as possible; your own ingenuity must devise the means. Turn this sward over about the 1st of May, and plant your corn immediately, in hills 4 feet apart, to save labor in cultivating; in drills it will yield most, but the labor in tilling is increased fully equal to the gain.

Grasses.—In low ground plough your land about the last of August, and put some fine manure upon the top of the furrow, and seed immediately. The first rain will bring it up, and it will get well rooted before winter. In this way you may renew your meadows without the loss of a crop, and improve the yield both in quantity and quality.

Roots.—These may be easily raised on good land; but their value for feeding has been over-estimated. I have found their fattening properties, when compared with corn, as one to five. Potatoes are worth about half as much as corn for man, but are not much better for beasts than carrots, beets, and turnips.

Respectfully, yours,

SILVANUS BOURNE.

FARMINGTON, CONNECTICUT,
December 30, 1852.

DEAR SIR: In answer to inquiries from the United States Patent Office, enclosed in yours of the 22d, requesting me to answer such questions as I am most familiar with, I send you the following estimates, as my experience and observation on growing sheep and wool, and will answer the questions in rotation:

First. Is wool-growing profitable? Wool growing I believe to be the most profitable business of the farmers in the county of Franklin.

Second. Cost per pound of growing coarse or fine wool? Cost of

coarse wool, 33⅓ cents per pound; cost of Merino wool, 26 cents per pound; cost of Saxony wool, 42½ cents per pound (washed on the sheep.)

Third. Are large or small sheep more profitable, either for mutton or for their fleece? The Merino is the most profitable for wool and mutton; the Dishly and Irish for raising lambs for the market. The butcher and drover will tell you that large sheep are most profitable, for the reason that there are less draughts in weighing large sheep.

Fourth. How much more does it cost to produce a pound of Merino than of ordinary coarse wool? You will perceive by the above estimates that the expense of growing coarse wool, over fine Merino, is 28 per cent. By actual experience, I find 2½ pounds of hay per day for a Merino sheep to be as much as they will consume through the winter, of one hundred and fifty days; native sheep will eat about the same as Merino. The difference in the expense of keeping large and small sheep is in proportion to their difference in weight. We charge the wintering of sheep to the wool they grow; their lambs paying for washing, pasturing, and other expenses.

Fifth. The proportion of lambs annually reared to the number of ewes is five lambs to six ewe sheep, over one year old.

To put a Merino buck with coarse woolled ewes improves the stock of the latter very much. In my allusion to Merinos, I mean the most hardy kind. I find there is a great difference in the various importations.

For a further description of what I call the right kind of Merinos, I enclose a specimen of wool grown on a Merino ewe, that grew six pounds two ounces of washed wool, and raised her lamb last season.

Yours, respectfully,

T. WENDELL, Jr.

Dr. Perkins,
President of the Franklin County Agricultural Society.

Remarks.—The sample of wool which came in the letter sent by Mr. Wendell is remarkably clean, and reasonably fine for Merino, or a few shades below Saxon wool. Mr. W. speaks from experience and with confidence, and is, probably, not far from the truth in his several statements.

Litchfield, Connecticut,
December, 1852.

Sir: Litchfield town and county have in former days been somewhat celebrated as pioneers in the work of training men and minds for usefulness, and for places of honor and trust in this widely-extended country. Many of our ablest statesmen and jurists have in *this* town, under the guidance of such men as Keever, Gould, and Huntingdon, been fitted for the important posts which they were afterwards called to fill, (more than 1,000 in all;) and many, very many, of the great men of our land first saw the light of the sun as it shone on the rough hill-tops of this county. Litchfield, also, was a pioneer in the work of training the mind

of woman. The Female Academy, by Miss Sarah Pierce, opened in the year 1792, was one of the earliest schools of the kind established in the United States. And as in mental culture, so in the mechanic arts, we, of this county, have not been last, nor least. The clocks from Plymouth, the scythes and axes from Winsted, and the woollen cloths from Wolcottville, have been celebrated almost throughout the country long time ago; and more recently, in Salisbury, there has been established the pioneer shop for manufacturing American pocket cutlery, already followed by one in Plymouth, and others in this State. But if Litchfield has been somewhat celebrated as above stated, she has been more so in a different line. There is not, perhaps, a county in the United States where so many fine steers and oxen have been raised as in this. To particularize the different towns of the county might be thought invidious, where nearly all take so much interest in the subject. The Messrs. Hulburt, of Winchester, were the *pioneers* in raising stock from imported Devons, and their celebrity is to this day as extensive in our country, as their orders received for bull calves from year to year will show. Mr. Case, of Harwinton, has a Devon bull which was imported a year ago at great expense—a very fine animal.

The stock of the county are generally grade animals, being a mixture of what is usually termed native and Eaton breeds, with or without Devon blood. The usual manner of breaking in steers is to yoke them at any age from one year to two and a half years old, and put them between two pairs of cattle, to drive occasionally until familiarized to the yoke and driver; then, when returning towards their place of keeping, after having been a while from it, to put them on the lead, and accustom them to mind the motions of the whip, and haw or gee, as told. As they advance in training, put them on the pole or neap of the cart or sled when empty, and accustom them to hold it back or carry it steadily down hill. Use and care in driving by an experienced teamster will soon make them perfectly tractable and handy. A large proportion of the finest steers raised in the county, and broken to the yoke, are sold out of the county at four or five years old; and many of them are those which have taken premiums at the shows and fairs of the adjoining counties of Hartford, New Haven, and Fairfield, in this State, and at the New York State fair, and that of the American Institute of New York city, but more particularly bulls and heifers at the two last mentioned places.

CYRUS CATLIN.

COLUMBIA, CONNECTICUT,
December 30, 1852.

SIR: In reply to your Agricultural Circular of August last, a copy of which came to hand, I would say, that corn is the principal crop with us. Guano is but little used; average product, about 40 bushels per acre. Cost of production varies much; an average, perhaps, would be 25 cents per bushel for the labor. I planted, the season past, 2½ acres on a field which had been pastured for about 30 years previous, and it was considered worn out. In the spring of 1851, it was ploughed up; July 1st, ploughed again; 12 loads (25 bushels each) of barn-yard manure spread on; two bushels buckwheat sown and harrowed in; product, 40 bushels

buckwheat. In the spring of 1852, in May, 48 loads (30 bushels each) of coarse manure from the barn-yard were spread on; ploughed once; dunged in the hill with 20 loads (30 bushels each) of fine manure, which was carted on the fall previous; planted the 20th of May; rows 3 feet apart each way; yellow corn; hoed twice; running a cultivator between the rows each way before the first hoeing, and using a plough at the second; harvested by cutting up by the ground, and husked about the 20th of September; carted in and husked about the 1st of November; product, 196 bushels ears assorted corn, and 36 bushels of poorer quality, making 232 bushels of ears in the whole, equal to about 120 bushels of corn. I have measured out and shelled two bushels of ears; product, about one quart over one bushel grain. The whole expense, including drawing the manure last fall and this spring, was $40, or 33½ cents per bushel; cultivation, aside from the hauling of manure, $16, or abou 14 cents per bushel.

I have described this crop more minutely, as it is the ordinary course pursued in this vicinity. Considering the previous state of the field, I should consider this more than an average crop for the labor. It was so considered by my neighbors.

There is a spirit of emulation excited in regard to this and most other farm crops in this region, and I think I hazard nothing in saying that the average per acre of the corn crop has doubled in the last 20 years in this town.

The crop is usually ground before it is fed out.

Oats are a profitable and good crop; average, about 40 bushels per acre; usually do well; expense of cultivating, small; and a ready sale at about 42 cents per bushel. They are now worth 50 cents per bushel.

Barley but little cultivated in this vicinity.

Rye.—Our soil in the main is not fitted for this crop, it being springy and wet, except some sandy land on the borders of the small rivers, and occasionally dry knolls.

Clover and Timothy are the grasses mostly cultivated; average per acre, 1½ ton. Clover is thought to be injurious to horses by most people, tending to an irritation which results in the heaves. Others claim that if the clover is cured in a proper manner it will not produce irritation, or a cough, in horses sooner than any other kinds of hay; and this opinion seems to be gaining ground, and people are more particular about curing it. The results, as far as my observation extends, are most favorable to the latter opinion.

Butter is made to some extent; sold in the manufacturing villages at sixteen to eighteen cents per pound in summer, twenty to twenty-five cents in the winter.

Hogs are raised only for home consumption. There is much emulation among farmers in regard to them. Many, at sixteen months old, are made to weigh, when dressed, over five hundred pounds. Pigs, at eight months, are often made to weigh three hundred pounds and over. Making pork here is a good business at present prices—eight to nine cents per pound in the hog.

Irish potatoes are a good crop; but have suffered by the rot in past years, and farmers have not planted so many as usual. The past season they have escaped entirely.

Fruit is beginning to receive attention, and I am satisfied can be

made with us an exceedingly profitable crop. Our soil seems to be favorable. The yellows are destroying our peach trees, however. I know of no remedy except one, which I regretted to put in practice last spring, to wit, hitching a yoke of oxen to the trees and pulling them up, root and branch, as I did some favorite ones.

Respectfully, yours,

JOHN L. YEOMANS.

BRUNFORD, NEW HAVEN COUNTY, CONN.,
January 25, 1853.

DEAR SIR: By the politeness of C. M. Ingersoll, esq., I received your Circular some time since, and, more recently, am still more indebted to him for a copy of the Patent Office Report.

These reports are very useful, and highly prized by the farmers; and I could wish that every man that tills the ground of our beloved country was possessed of these books.

My home is in New England, in one of the oldest towns in Connecticut. The land here has been cultivated for more than two hundred years; and yet, when properly improved, is capable of producing, and does produce, as good crops as most any other section of the country. The manures mostly used are barn yard manure and white fish, (manhaden,) although the latter is not so much used as formerly.

Wheat.—But little is raised here, for the reason that, years past, it could not be raised; but last summer some fine pieces were grown here. One man told me he had as fine a piece of wheat as ever grew out of the ground. It is being more cultivated than formerly, and, if it continues successfully, will enlist the attention of farmers immediately.

Corn.—Corn is grown here extensively, principally for feed. People generally raise and fatten their own pork. Hogs will fatten on ground corn. I cannot tell what the average yield per acre is; some large and some small. It is generally planted on grass ground, turned over with a coat of barn-yard manure. Some turn in rock-grass with yard manure, and some add a coat of manhaden at the first hoeing; others think it best to put on a coat of fish at the third hoeing, just as the corn is setting, which tends to push out, and fills the ears more perfectly.

Oats.—Oats are not so much raised. Formerly it was the practice to seed our land down in grass, with oats; but of late years grass seldom comes in with oats; so that oats have, in a measure, gone into disrepute.

Rye.—Rye has become quite a favorite with our farmers. Grass succeeds much better sown with rye than oats. A mixture of wheat and rye is frequently sown together.

Grass.—Herdsgrass and clover are grown here. Herdsgrass is the chief. It is now almost universally sown in the fall; sometimes alone, but oftener with rye or wheat.

Clover is sown in the month of March, on a light snow generally, the object being to secure a crop of grass the first year. The clover is soon overcome by the more hardy herdsgrass.

Neat Cattle.—Probably there are more neat cattle in the town than were born here. If it were not for making manure and disposing of

some of our poorer kinds of hay, the raising of neat cattle would not be profitable.

Potatoes.—Irish is the crop on which the farmers principally depend as a source of income. Being on Long Island Sound our potatoes find a ready market in New York city, by means of coasting vessels. We have suffered much from the rot for some years past; know nothing of the cause, but are well acquainted with its effect. The past fall our potato crop was nearly free from the rot; the average yield would not be more than one hundred bushels to the acre, if that. Those planted early have succeeded best; those planted late rotting more than early ones. Last year late ones did very well, not rotting.

Manures.—Perhaps nowhere in the United States are manures of more importance than to the New England farmer. Without it we can do nothing; with it we succeed in raising fine crops, by careful attention. To us the study of the nature of soils and manures is of vast consequence, and, indeed, necessary.

I have not had much experience in agriculture, or, rather, my experience has been such as would bear testimony that, with improper treatment, good New England land can be made to bear *small crops*.

It was formerly our practice to drain our yards, and keep them as dry as possible; but now I feel perfectly convinced of the folly of such a course.

If I were to build a barn, I would have a cellar under it; which I think would be better laid with stone and cement; although yards are dishing, and there is no chance for the liquids to run off, yet, the best part of it will be constantly soaking into the ground. Rock-grass is used, or has been used extensively some years past; it is a very good manure if you can get that which is good.

But, next to barn-yard manure, nothing has been so generally used as white-fish. The use of them has been the means of making many fertile fields of land, which were before barren and unimproved; although many times they have been used injudiciously.

I was thinking, if these Reports from the Patent Office could be more generally distributed amongst our agriculturists, or be placed within the means of our farmers, they would be eagerly sought for, and prove a blessing to the nation. I am not aware that the books can be purchased at any book-store, or of any agent.

After Congress have published their quantum, if many thousand copies extra were printed, to be sold at cost of publishing, I think that many of a class who seldom now, if ever, get hold of one, would soon have them after an opportunity.

I am, very respectfully, yours,

SAMUEL BEACH.

WESTON, SOMERSET COUNTY, N. J.,
December 20, 1852.

SIR: In compliance with a request contained in your Agricultural Circular, I forward you some practical hints on the different crops which are cultivated in this part of our State.

Wheat, varieties sown: Mediterranean, white flint, red chaff, Hutchi-

son, old ball, and several others; Mediterranean, however, is the kind which is mostly sown; in fact there is more of that kind raised than all others together, and when cut in the dough state makes a very superior flour, since it has become acclimated among us; bakers considering the flour from good Mediterranean wheat superior to any others for bread, because it is stronger and will bear more water. I would here remark, that I consider any wheat better by being cut while it is so that you can mash most of the grains between your fingers when you commence cuting. If left until fully ripe, the bran is thicker, and of course is more liable to be cut up among the flour.

Our rotation consists of the five-shift course, commencing with corn on the sod, which has been top dressed with lime the previous year, and ploughed under in the fall or spring. The corn is followed by oats, which being harvested, the stubble is turned under about 7 inches or more, (the deeper the better for wheat,) manure spread upon the ground and ploughed two different times after, and a portion of lime—say 50 bushels per acre—harrowed in with it; when it is sown with wheat and Timothy seed in the fall—say by the 15th of September; clover-seed is sown in the spring. About 2 bushels of wheat and 6 quarts of the grass-seeds per acre are used. The wheat has the important advantage of succeeding two cleansing crops, and the ground, after harvesting the wheat, is left in fine condition for hay grasses. The first year after the wheat is harvested, the grass is mown; the second, pastured; after which, the sod is again turned under for corn, and the rotation recommences.

Guano is used by some farmers in large quantities, who apply from 200 to 400 pounds per acre. It is considered an excellent and economical manure for wheat; 400 pounds will generally give 30 and 35 bushels per acre on land that would not give 15 bushels without it. We have an article called the superphosphate of lime, manufactured on a large scale, which comes at the same price of guano; it is composed of bone dust dissolved in sulphuric acid and mixed with sulphate of ammonia and guano, and it is said by those who use it to be superior guano, inasmuch as it is all soluble, not volatile, like guano.

Average yield per acre, about 20 bushels; though some farmers get as much as 40 bushels per acre. After sowing, we sometimes use the plough to work in the grain, which, by the way, is one of the best modes of putting in wheat. Some use the cultivator, which answers very well. Within the last two years some farmers are introducing seed drills, and, when the land is not rough, these machines will prove very valuable to the farmer. By using them there is a great saving of seed. The yield is generally on the increase; land improving rapidly by the use of the subsoil-plough, and by the draining of the wet lands. Many farmers who use tile and stone for draining the wet lands get paid for all expense in the first crop raised after, especially when planted in corn. Price of wheat, $1 12½ per bushel.

Corn.—This important crop is largely cultivated among us. New Jersey corn always stands highest on the list in the New York market. The practice of raising varies with the location. Some lime and plough up the sward without any manure; others draw out all their barn-yard manure, in the spring, on their corn-ground, and plough it under as deep as the strength of the team will admit of. The last practice is generally followed in sandy and loamy locations, especially where wheat is not

much raised. Varieties: the eight rowed white and yellow, which are the kinds most esteemed in New York market; likewise, the twelve and fourteen-rowed white and yellow, which answers better on rich lands, as it does not sucker. Average yield, about 40 bushels per acre; and some premium crops have gone over 100 bushels per acre. I use the plough first among my corn, and cut it close from the hill; for corn, when young, wants the ground warm and dry; and I know of no better way than to cut close by the row, so that it will warm and dry through; and after laying a few days, I cross it with the cultivator, and continue to work it with that implement. I hoe until the middle of July, when I plough it for the last time, by throwing the dirt well to the hill. I would here remark, that the last summer I tried the experiment of using the cultivator with the plough, in finishing off a field of corn; I worked one cultivator with three ploughs, in the same field, and the same day; and we had a very dry summer, so that all the corn suffered greatly from drought, especially when it was not subsoiled; but that which I finished off with the cultivator suffered most; and I worked the cultivator alternately among the ploughs, so that the experiment reached all the parts of the field. In the same field, I had some 15 acres which were ploughed and subsoiled 22 inches deep four years ago, and 2 lands left which were not subsoiled, but in all other respects treated precisely alike—and the land all as nearly alike as possible, as to quality. And we had no rains the past summer, to wet plough deep, until the 25th of August; but the subsoiled land stood the drought, so that the corn scarcely ever twisted, while the portion which was not subsoiled was nearly all dried up. My land is a sandy loam. I grind corn with oats for horses, but prefer cooking the food for all other kinds of stock, especially hogs and beef cattle. For cattle, break up the ears, and mix a portion of oats or wheat "ship-stuffs," or buckwheat, and then put all in the kettle, with a portion of salt, and boil it until the corn is soft; then feed it warm. I am fully satisfied it is best, from experiments I have made, and which I shall mention hereafter.

Rye.—Rye is cultivated but little—chiefly in inferior soils. It is raised mostly to bind corn-stalks with. Average yield, not over 12 bushels per acre. Average price for the grain, 75 cents per bushel.

Peas.—Peas and beans not cultivated to any extent in the county. They are only raised for family use, and not for market. Peas seldom grown out of the kitchen-garden.

Clover and Grass.—Our principal crop of grass, which is Timothy and clover, is raised on upland, and sowed with wheat and rye, following the regular rotation of other crops for 2 or 3 years in succession. We have also our natural meadows, which are seldom ploughed; and which, by irrigation, and occasional top-dressing with short manure, are very productive, not only for hay, but in autumn for the pasturage. By top-dressing, our meadows are made to produce a fine sward of natural grass, which is equal, if not superior, to any other, both for hay and pasture. Average of hay per acre, on upland, in favorable seasons, is about 2 tons; lowlands, rather more. Not much hay sold in this county. We have no large towns to supply.

Oats.—Oats are cultivated on any of our soils that will produce corn or potatoes; usually follow corn. Seed two bushels to the acre on well tilled soil, and more on poorer land. Usual time of sowing is in April,

or as soon as the land can be worked late. Oats make full as much straw, but less grain. Average crop, about thirty bushels per acre. Oats are considered the best feed for road horses, and good for all kinds of stock, especially when mixed with corn and ground; they are not considered a great exhauster of the soil, but are a very cleansing crop, and leave the land in fine condition to be worked for a crop of wheat. Clover will do well if sown with oats. I always use the roller on oat ground, it works so much better; gathering (as it frequently gets beat down with storms) about the time of ripening.

Barley.—Average crop in former years was thirty bushels per acre; sown the same time of oats. It has usually followed corn, and leaves the land in fine order for grasses, and is considered a light crop on the soil.

Dairy Husbandry.—Considerable attention is paid to this branch of business. Cows for the dairy have been much improved within the last few years. Many cows may be found that will produce from nine to twelve pounds of butter per week, on grass alone, for some three months together; but no farmer has a whole herd of such cows. Where we have one such cow, we have six that will not produce more than from six to eight pounds per week for the same time. One class of our farmers say, in theory, the Ayrshires or Durhams are the greatest producers; in practice, the other adopts the native breed, because he happens to have them, or, more likely, because he has not thought on the subject at all. Our good cows are mostly those of accident. There are, however, some honorable exceptions among some of our most liberal and intelligent farmers. The Ayrshire stock is being produced, and, from present appearances, will be a valuable acquisition to the dairies of Somerset county. They are a hardy race, and do better on uplands, and in dry seasons. The Durhams are a larger and heavier race, and require good lowland pasture to fully develop themselves. As milkers, farmers are paying considerable attention to crossing both the abovementioned stocks with their best natives, and, consequently, are improving the race of milkers.

Neat Cattle.—Fifty per cent. of all our cattle are raised in the county; the other half are driven principally from New York State or Ohio. The foreign stock is purchased late in autumn, principally for the purpose of consuming the poorer kinds of fodder, and to be grazed in the summer to supply our markets with early beef. Young cattle, from two to four years old, that are in good condition the 1st of May, are turned out into the sweetest pastures, and are fit for the market by the 1st of August, before the Western or Northern beef comes in, and pay better than larger and older cattle, that depend upon winter stalling, and consume much grain, which is quite too costly for this market; and the beef is worth little more per pound than the grass-fed beef, which goes into market early. Many farmers graze two lots of cattle in one year; purchase a lot of fleshy ones late in the fall, when beef is down in price, and feed them on until late in the spring, when they pay very well; but the facilities for sending in Western cattle now by railroad interfere considerably with our trade. I will now mention an experiment I made three years ago in feeding a lot of cattle with cooked and dry-ground feed. I selected two pairs of cattle from among eight pairs, which

were equally conditioned, and which I had fed alike for about the same time. They were weighed on the 1st day of January, 1850.

No. 1 weighed 1,620 pounds.
No. 2 " 1,750 "
No. 3 " 1,670 "
No. 4 " 1,510 "

Nos. 1 and 2 were fed during January on 9 pounds corn and oats—not ground—in the proportion of nine parts corn to five parts oats, by measure, and boiled in a three-barrelled kettle, in which were placed 36 gallons of water, 1½ quart salt, and about 7 bushels of the grain, mixed as above; boiled this mixture for two hours, using only an armful of dry wood and two bushels of corn-cobs as fuel. I then cover the kettle, placing over the cover a horse-blanket, keeping in the steam, and preventing the rapid cooking, and by this means the contents of the kettle will remain warm and soft until fed out.

Nos. 3 and 4 had 10 pounds of ground feed, mixed in the same proportion of oats and corn, (but not cooked,) each day. In every particular all four were fed alike, having a small quantity of carrots and turnips mixed each day, with as much common hay and corn-stalks as they chose to eat.

On the 1st of February they were again weighed.

No. 1 weighed	1,725 pounds,	having gained	105 pounds.
No. 2 "	1,850 "	"	100 "
Weight February 1	3,575		
Weight January 1	3,370		
Gain in one month	205 pounds.		

Nos. 1 and 2 had cooked food during the month of January, and gained 205 pounds.

No. 3 weighed	1,750 pounds,	having gained	80 pounds.
No. 4 "	1,550 "	"	40 "
Weight February 1	3,300		
Weight January 1	3,180		
Gain in one month	120 pounds.		

Nos. 3 and 4 were fed on raw feed, ground, and one pound greater per day in quantity than that fed to Nos. 1 and 2, not ground, and cooked; and still, although in every other particular they were fed alike, the difference in favor of cooked feed is very large. The expense of grinding being greater than the expense of cooking, the economy is every way in favor of cooked feed.

Gain with cooked feed	205 pounds.
Gain with raw feed	120 "
Gain in favor of cooked feed	85 "

On the 1st of February I ceased to use turnips and carrots, and sub-

stituted best clover hay for common hay and corn-stalks. Fearing the great difference in favor of cooked feed might arise in part from the peculiarity of the cattle, in regard to health, or some other accidental cause, I now changed them, and put Nos. 3 and 4 on cooked, and Nos. 1 and 2 on raw feed; increasing the quantity of feed to each pair two pounds each.

Previous to commencing the experiment, on the 1st of January, each pair had been accustomed to the use of some roots, pumpkins, &c.; and this may account for the change I am about to describe after a discontinuance of the roots.

From the 1st of February to the 1st of March Nos. 1 and 2 were fed on ground feed raw; Nos. 3 and 4 on whole cooked feed. On the 1st of March they were weighed again, when Nos. 3 and 4, on cooked feed, had gained but 47 pounds, and Nos. 1 and 2, on raw feed, had gained but 22 pounds.

It will be seen from the above that although the cooked feed, at least cost, continued to produce most growth, and in about the same relative proportion, still each pair, when fed with roots in addition, gained much more rapidly than when fed on grain and clover hay alone. I would here remark that 16 pounds of oats and corn, in the proportion above named, will weigh, when cooked, 34½ pounds; and that all four of the cattle were fat when I commenced the experiment.

The farmers select their best calves for raising. The usual way has been to take them from the cow at three days old, and teach them to drink milk; new milk is given until three or four weeks old, and skimmed milk until ten or twelve weeks old; after which they are turned out to shift for themselves in good pastures. The above is considered more judicious than to let them run with the cows, as it is considered injurious to the cows to be teased by them for so long a time, and not so well for the calves. Cost of raising until three years old, $25. Steers and heifers that are raised in this manner are always in demand, and command 25 per cent. more in price than the stock from the other States.

Sheep are not kept to any extent in this county. Small flocks are kept principally for producing early lambs, which sell from two to three dollars per head, and are considered profitable by those who have the convenience of keeping them. Our graziers, however, have been in the habit of buying a considerable number of Western sheep, principally wethers, which they buy in June or July from two to three dollars, and sell in the fall and winter sometimes as high as from four to six dollars per head; but sheep, like cattle, are now brought from a distance on railroads, and do not pay so well as formerly.

Hogs.—A considerable number of hogs are fed in this county, mostly on spare milk from dairies. The best breeds are Berkshires, Woburns, and Suffolks, crossed with the China.

Hogs are most profitable when turned out in clover, until fall, with plenty of running-water, or a good apple orchard is very fine to start them; but they do well in clover alone. In the fall, when corn begins to harden, commence feeding them moderately until about the 1st of November; after which, they should have all they will eat, until the last of December, when they will average three hundred pounds apiece, if they are the right breed, when sixteen months old; which, at present

prices, viz: 8 cents per pound, pays very well. Where the food is cooked, it will go 25 per cent. further than when fed raw.

Curing Hams.—The best method I have found for curing hams is, after the hams have been cut, let them lie out on a shelf, where they can have plenty of cool air, so that the animal heat is entirely out of them before you attempt to put them down in salt; then corn them down for two or three days; after which, drain off any bloody water which may come out; and then make the following pickle, sufficient to come them: Take 9 pounds of salt, 3 ounces of saltpetre, 1 ounce of saleratus, 4 pounds of brown sugar or molasses, and six gallons of water; let them lie in the above pickle from three to six weeks, according to the size of the hams; when you may take them out and smoke them with good hickory or apple wood until sufficient to suit your taste. They should be taken down and hung up in a dry, cool place, in bags, to protect them from the flies.

I have hams cured after the above method, which were almost as fine when eighteen months old as when taken from the smoke-house. And while upon the subject of hams, I would further say that, when you boil them, they should be boiled until done, in good, soft water; and, when nearly done, throw in a handful of clean Timothy hay; it absorbs all impurities which may be around the outside of the ham. As soon as done, take out the hay, but leave the ham in the water until nearly cold, when you may take it out.

Root Crop.—Fifty per cent. more roots are now raised than five years ago—principally rutabagas, turnips, and carrots.

The carrot is considered most valuable—almost equal to oats—for horses, especially when used with a portion of grain. Yield, from five hundred to six hundred bushels per acre.

Manures.—As I before said, the farmers of Somerset county are rapidly improving, from the fact that there is more attention paid to the manure heap. In the first place, the farmers are clearing up their wet lands, by ditching and draining; and the ditch-cleanings, after they are thoroughly decomposed, either by frost or lime, are mixed with barn-yard manure, and used for wheat—about equal portions of ditch-dirt and manure, with a small quantity of lime sprinkled on the dirt—or a mixture of lime and salt, in proportion of one bushel of salt dissolved to slack four bushels of lime, which, after being turned over three or four times, and lying one month, is the most powerful decomposer which can be used; and, besides, it retains all the gases of the manure, which are set free by the use of lime.

The above compost, after lying some months, is turned over and mixed thoroughly, and then, in ten days, or as soon it goes into heat, is fit for use; and a cord of the above mixture is equal to a cord of barn-yard manure, after lying in the yard all summer.

Barns are built with special reference to saving manure—with cellar under the whole, and sheds attached for manure. My plan is to have single stalls, so that I can put up every animal on the farm, when it is necessary. I have some with gates made, so that the animal cannot turn round; and racks, the full length of the stable in front, to feed hay or stalks from; but for roots and feed, I use loose boxes. In other stables, I tie up the cattle; but, from experience, I find gates are best. I

have a gangway, full length of the stable in front, to feed without entering the stalls; and as the cattle never turn round, (but, at the same time, can lick themselves,) they are easily cleaned out every morning, and placed under the manure shed; and the stalls are littered down again for another night; so that all liquid manures are absorbed in the litter, and carried out under the sheds every morning.

Towards spring, as the weather gets warmer, I use ground plaster to sprinkle the stalls, which absorbs all gases. Charcoal dust is better, however, when it can be had. In summer, I never stable cattle except in very stormy nights; but I find, in winter, cattle do much better in stalls; and, having them separate, you may feed each one with what you choose, without the others interfering.

Very respectfully, yours,

JAMES CAMPBELL.

To the COMMISSIONER OF PATENTS.

SALEM, SALEM COUNTY, NEW JERSEY,
December 25, 1852.

SIR: Having received a Circular, propounding certain questions relative to farming operations, I herewith send the following answers—being to some of the questions which apply more particularly to this locality:

Wheat.—Guano is used in the production of wheat to a considerable extent; about 200 pounds per acre is the quantity generally applied; sometimes of little benefit—at other times it produces from five to ten bushels per acre extra, besides adding to the after crop of grass.

It is thought to be most beneficial ploughed in; quantity of seed per acre, from five to six pecks when drilled, and from six to eight pecks when sown broadcast. The drill is much used here. The average yield is from 15 to 20 bushels per acre, and increasing. Timothy and clover seeds are generally sown; the former in the fall, the latter in the spring; average price, 95 cents per bushel. The rotation of crops generally practised here is, corn after grass, which is followed by corn, oats, or potatoes; then wheat; and grass follows wheat.

Corn.—Guano is not much used in the production of corn; average crop, 50 bushels per acre; some fields yield nearly 100 bushels; the season having been all the farmers could ask as regards moisture, but rather cool for corn. A sod is considered best for corn, ploughed soon after the frost leaves the ground—the earlier the better, so as to give the rains and other influences time to pack the ground previous to planting; which gives the young corn a better chance to take good root and grow off early.

Oats.—Not much grown, having given place, within a few years, to potatoes. The crop good—from 40 to 50 bushels per acre.

Barley, rye, peas, and beans not much cultivated.

Clover and Grasses.—About an average crop, one and a half ton per acre. Experience does not show that red clover is injurious to horses when fed in moderate quantities.

Dairy husbandry is not followed to any great extent, but must increase, owing to the facilities which are being made to convey our productions to market. A neighboring woman made 3,000 pounds of good

cheese, from ten cows, in four months, and sold the same in Salem for eight cents per pound.

Buying store cattle, and fattening them for market, has been followed in this section.

Root Crops.—These have not been cultivated to much extent.

Irish Potatoes.—The cultivation of this crop has been much extended, but the crop per acre has diminished; average this year, not over 50 bushels per acre—not so profitable as corn. A very large yield was anticipated until near the end of summer, when the vines died suddenly, without any satisfactory reason having as yet been assigned. Some say worms in the vine killed them; but I could find none in mine. Others say a hot sun after a heavy rain; but this is only conjecture. Best system of planting is in rows, in every third furrow, with a small plough. We manure from the yards, and spread broadcast; some plough twice, and some only once, and some rake the manure on the potatoes. Where marl is easy of access, (this being the marl region,) it is used to a great extent on potatoes, and produces the best. As soon as planted, run the fallow harrow over the ground, and continue to do so after every rain, sufficiently heavy to pack the surface of the ground, and start the weeds and grass, until the vines begin to bud; then use the cultivator and plough.

I have had a machine made far preferable to the plough, as a boy 10 or 12 years old can work it. Half a round to the row is sufficient, and it does the work better than a plough. I had 5 small ploughs set in a frame similar to a cultivator, 2 on each side of the frame, so as to throw 2 furrows to each row; and another, with 2 mould-boards to follow, to clear up the middle. In order for the machine to perform well, it is necessary to keep the ground mellow.

Fruit Culture.—The cultivation of fruit is receiving increased attention; and it is profitable both for market and home consumption. So much has been written and published on the cultivation of fruit within the last year by the pomological societies, that, although a nursery-man, I pass it by.

Manures.—Lime, plaster, and marl are much used as fertilizers. Plaster is used on clover at the rate of from a half to a bushel per acre, which more than doubles the crop in many places. Soaking seed corn and rolling in plaster help to give it a start; and also a good color.

Respectfully,

DAVID PETIT.

LOWER ALLOWAY'S CREEK, SALEM COUNTY, N. J.,
December 22, 1852.

SIR: I find thy Circular still lying beside me unanswered, after having had it in my possession some months. It will be but little information I can give in answer to thy queries. Yet I will take them up in order as they are asked, and pass over such of them as relate to crops not cultivated in our section of the country; endeavoring, to the best of my humble abilities, to give satisfactory answers.

1st. *Wheat.*—Guano is used to some extent on this crop in our section of the State. As to the exact increase 100 pounds of guano will produce, I cannot say; there being no experiments (that I know of) in

my neighborhood made with sufficient accuracy to ascertain it. I will attempt, however, to approximate it in the following manner, which those acquainted with the raising of wheat can interpret for themselves, and judge whether, in their own cases, the reasoning would be correct.

I have now growing on my farm a field of wheat, part of which was manured with 300 pounds of Peruvian guano to the acre, and the other part with barn-yard manure, about 18 two-horse loads to the acre, and the appearance of the guanoed wheat is fully equal to that manured from the barn-yard. From my former experience, I can, I think, safely conclude that the guanoed wheat will continue as good until harvest, and produce as much as my other wheat. Wheat will not do well in this section without manure; and I believe that the difference between my manured and unmanured wheat will generally be one half. My general average is about 25 bushels per acre; allowing one-half to be produced by manure, $12\frac{1}{2}$ bushels, it will be $4\frac{17}{100}$ bushels increase to 100 pounds of guano.

The average product of this (Salem) county is, I believe, about from 18 to 20 bushels to the acre; although 30 and 35, and even 40 bushels, are sometimes raised on our best farms. The Mediterranean is the variety most generally raised; and it appears to suit our soil and climate very well. The blue-stem is somewhat cultivated; and the white, golden, and Australian are also sown by myself and others in my neighborhood. It has a very handsome grain, yielding well both in quantity and quality of flour; and in warm, rich lands, it promises to become a very valuable variety. We sow about the last of September, or the first week in October, using about 2 bushels of seed per acre; and harvest the last of June, or first of July. We usually plough twice before sowing, 6 or 7 inches deep. Our yield is, without doubt, on the increase. Our system of rotation differs some in different situations. Some farms have meadow-lands lying on our creeks and rivers unsuitable for tillage, but enabling the owners to crop their uplands oftener. We may, perhaps, set it down at 4 years. My own system is, however, once in 3 years. That is to one crop of Indian corn followed by either oats or potatoes; and these again by wheat, sown down with clover; but the clover is not suffered to remain, for I plough it under the next spring for corn again; and so on, as before. I set apart a portion of my land for grass, and allow it to remain a number of years, giving it an occasional top-dressing; believing a three-course system better suited to Indian corn than a four, and, with proper manuring, no disadvantage to the wheat crop. The best remedy for the Hessian fly is, in my opinion, to sow early. Our average price for all kinds of wheat for this year may be set down at $1. When Timothy is used, we generally sow in the fall; clover, early in the spring—as soon as the frost is out of the ground.

2d. *Corn.*—Guano is beginning to be used with us, and I believe with advantage in the production of corn. It is generally sown broadcast, and ploughed in in the spring, when breaking up the ground for planting; the quantity used is from 200 to 300 pounds to the acre. It is sometimes mixed with dirt and applied in the hill to advantage, particularly in low and cold lands. It is not easy to ascertain the average product; but in this county we may average from 40 to 50 bushels; some of our best farms have yielded in favorable seasons as high as 75 or 80. I believe from my own experience Indian corn is best planted on a clover

lay; ploughed late in the spring, harrowed before planting and rolled, if the ground be dry enough. Cross-furrowed four feet three inches apart each way, with from three to four grains in a hill.

Oats have formerly been extensively raised in this county; but potatoes are now fast taking their place. They are a very uncertain crop, averaging from 30 to 50 bushels per acre. I do not consider them profitable, but they come off the ground very seasonably to be followed by wheat. The quantity of rye raised is very small compared with what it was some years ago—perhaps not over one-tenth; and in my immediate neighborhood there is none. We are in the habit of sowing clover and Timothy, about equally mixed, on our uplands for hay; and the yield is from one and a half to two tons the acre. The best fertilizer for meadows with us is winter flooding and top-dressing with upland dirt, because most profitable. For upland pastures I prefer long barn-yard manure, spread over the ground in the month of February. In our best banked meadows Timothy is preferred. The quantity of seed used is one bushel to five or six acres. In our low meadows we use the herdsgrass, (red top,) one bushel to the acre. I believe that it is not safe to feed red clover unmixed to horses. We are too far from market to do much with butter; the average price here this season being about 15 cents the year round. Cheese brings about 8 cents. I think we cannot raise a good steer until three years old for less than $20, and the usual price with us is from $25 to $30. Good dairy cows will command from $25 to $30, there being but little difference between spring and fall, owing to our having plenty of fodder, which we prefer feeding on the farm to selling it off and buying manure. In addition to our native breeds of cattle, we have Durhams and Devons, and it is thought that a given quantity of grain will produce more meat in them than in the native stock. Oxen were formerly used for work in our section, but they are now almost entirely abandoned for horses and mules; the rearing of which I consider profitable. The expense of rearing a colt until three years old will vary much according to feed, &c.; but I believe a good colt may be raised for $50.

Hogs.—The Berkshire and Chester county are both very good breeds. Our method is to raise on clover, and fatten on corn in the fall, which is mostly fed to them whole; but some grind it. I generally rub my hams with fine salt and sugar mixed together, lay them in the cask dry, and in the course of 4 or 5 days make a pickle, sufficiently strong to bear an egg, adding about one-half gallon of molasses and one-half pound of saltpetre to 100 pounds of ham, which I pour over them in the cask, so as to cover them, and let them remain in the pickle about 5 weeks.

Root crops are not cultivated with us as field crops, although I think they might be with profit. Irish potatoes have been extensively raised within a few years past in this part of our State. We consider the Mercer the most profitable variety on account of its ready sale; it generally brings about 50 cents a bushel at Salem or Hancock's Bridge, our nearest markets, yielding about an average of 75 to 100 bushels to the acre. Sweet potatoes are also extensively raised on our light lands for the Philadelphia and Wilmington markets, yielding a good profit to the owners of those soils.

Manures.—We gather everything we can into our barn-yards, composting very little, and finishing out with lime, guano, and gypsum.

We use about 50 to 100 bushels of slaked lime to the acre once in about four to six years. Gypsum, in my immediate neighborhood, does not appear to answer well as manure—supposed on account of salt air; but it is extensively used further from salt water. It has frequently been tried here, but uniformly without success. One of my neighbors tried it in four different places on three different crops this season, but without the least sign of effect; another one tried it upon clover, but without any perceptible effect. All this, it is true, was very well known to those who read before; but it has been said that "Eternal vigilance is the price of liberty:" so also truth can only be maintained by an eternal warfare with superstition and error. In the case of plaster, the evidence formerly adduced, that salt air would destroy its effects, seems to be losing its hold on the community.

Thine truly,

THOMAS SHOWRDS.

NEW YORK, *January* 15, 1853.

SIR: Presuming that the interests of agriculture are within the consideration of your department, I would ask your attention to the growth of hemp upon the extensive marshes along the coast.

These marshes can be reclaimed by enclosing them in a water-tight wall of hydraulic cement and sand, 2½ feet high, in sections of 160 acres, at an expense of about $4 per acre.

Hemp prepared in salt water is of a much finer quality, and preserves more of its original strength of fibre.

Respectfully,

EDWARD C. COOPER.

To the COMMISSIONER OF PATENTS.

OVID, SENECA COUNTY, NEW YORK.
December 27, 1852.

SIR: Your Circular in relation to the agriculture of this county for the current year was duly received. One of the undersigned having received one of the like kind last year, and answered it at some length, makes it difficult to respond to this and avoid unnecessary repetition.

The last winter was cold and the spring backward; wheat injured by the winter and also by the weevil; estimated at from 25 to 30 per cent. below a common yield; quality inferior; price here since harvest ranged from 87 cents to $1 a bushel; price of transportation to New York by canal, 14 cents a bushel; quantity sown to the acre of land, ½ bushel, and many of our practical farmers think it does best put in with the drill; varieties most esteemed are the Soule, the Hutchinson, and the white flint; some blue-stem was sown a year ago last seed time, but it did no better than other varieties. No satisfactory remedy has been discovered for weevils; they appear to do the most damage in such parts of the crop as have been injured by the winter; hence some conclude if we sow earlier and have an earlier spring, we may escape their ravages. The first remedy suggested may, and probably will, subject it to injury by the Hessian fly; and whether the same warm weather that will mature the wheat early will not at the same time bring to maturity the weevil, is yet to be tested.

The depth of ploughing for this crop in some localities is 7 inches, and sometimes more; it is said the average depth in the county will not exceed 7. In consequence of the weevil, very little spring wheat was sown, and that much injured.

The *corn crop* was above a common average; price 62½ cents; the best system of cultivation, on a sod, well ploughed and harrowed; the usual distance of the rows apart about 3½ feet. Some experiments have been made by marking out one way, and planting or drilling in about 15 or 20 inches apart, and dress and till it all one way, which sometimes gives a larger yield to the acre; but it is very questionable whether the difference in the crop is equal to the difference in the labor in its cultivation. In either mode the land should be manured before ploughing. Some prefer fall ploughing for this crop, as the corn comes up quicker and is easier tilled. Others object, that although this is so, fall ploughing subjects the crop more to the ravages of the wire-worm than if ploughed in the spring. Manure from the hog is generally taken out with that of barn-yard, and hence no satisfactory test of its particular benefits or comparative superiority. Corn should be ground when fed to stock.

Oats above a common average; price, 37½ cents a bushel; cost of transportation, 7 cents a bushel.

Barley.—The average yield of this grain is estimated at 21 bushels to the acre. A broader surface than usual was sown the last season. Yield, a full average; price, 62½ cents; cost of transportation, 10 cents. This crop is thought to be less exhausting to land than oats. The six-rowed is generally preferred. Both these crops do best on corn stubble; if on sod, it should be ploughed in the fall.

Beans and peas are cultivated to a very limited extent.

Rye is cultivated in some parts of the county; crop, a full average; price, 75 cents a bushel. Buckwheat is more extensively raised; this is thought to be a renovating crop and a purifier from foul weeds; crop this year is said to be good; these crops are generally consumed in the county.

The hay crop, average—estimated cost of cutting and securing a ton of hay, $1 25; of our grasses, white clover, spear and blue grass are indigenous, as is also red-top on moist soils; hence our cultivated grasses are Timothy and red clover, which are sown on winter wheat early in the spring and with our spring crops; of Timothy seed from 8 to 10 quarts, and of clover-seed from 10 to 14 pounds to the acre, which is sometimes mixed with Timothy at the rate of about one-fourth. Timothy hay is preferred for horses; it is thought clover inclines them to cough and heaves. Some of our farmers cut their Timothy either with the cradle or reaper for seed, leaving the stubble some 18 or 20 inches high, and then cut the stubble for hay; others cut in the ordinary way and thresh the whole before feeding; the yield of seed is said to range from 3 to 6 bushels to the acre; price of seed per bushel, $3. The clover most in use is the small or early kind, and is cultivated for hay, pasture, and seed; some of our best farmers do not pasture the first season; the top affords a protection during the winter; the growth in the spring is more vigorous, and the yield will be much greater, either for mowing or pasture. The crop of clover seed in the county the last year is estimated by those who were engaged in purchasing at 20,000 bushels; average price, $5 a bushel.

this year it was much injured by grasshoppers eating off the blow, in consequence of which the seed never formed, and although a larger surface than last year was cut it is thought the crop of seed will be much less.

The proceeds of the dairy are increasing; price of butter by the firkin 20 cents per pound.

Our stock of cattle are improving; the Devons and short-horned Durhams are most esteemed; it is said by some of our stock-breeders the Devons make the best working oxen, and the cows are best for the dairy; those engaged in fatting give preference to the Durhams for beef, but think they do not fat to advantage and make as good beef until 4 years old; before that age, to use their language, they "grow away from their feed."

No mules are raised in the county. The growing of horses is thought to be profitable; to rear a colt to 3 years old is said to cost from $30 to $35; add to this the loss of service of the mare, and pay for service of the horse, which will make the whole expense from $45 to $50. For breaking colts, the most approved way is to begin to handle them when young; in weaning put the mare and colt in the stable, tie them both up in sight of, but not so near as to reach, each other; in this way we avoid the running and restiveness, and oftentimes injury to the colt by bruises and surfeitings which happen if left in the field; and while it is weaning it is being halter-broke. Then continue to handle and secure its confidence by kind treatment, and as it grows and matures put on the saddle or harness, and when they become familiar with these then drive them until they understand what is wanted or required of them; then fasten them to a light draught, which increase moderately until they become accustomed to drawing. Colts treated in this way while young will generally go to work quietly when sufficiently matured for service, and are not so liable to frights and shying when driven as if left to some 3 or 4 years old before they are taken up; if bitting should be deemed necessary it should not be continued so long as to become painful; severity or whipping should not be applied until they are so far taught as to know what we want and wilfully refuse.

A practical farmer of this place, the last winter, by way of experiment, took a portion or lot of three grades of sheep, put them together, and were kept alike, with, as he says, the following results: First grade, Spanish Merino, full grown: average yield of fleece 5½ pounds; price per pound, 40 cents. Second grade, not full blood, one-fourth lambs; average yield of fleece, 3½ pounds; price per pound, 34 cents. Third grade, coarse wool, (sheep full grown:) average yield of fleece, 2½ pounds; price per pound, 28 cents. The carcasses of the coarse-woolled were worth the most when sheared. Thinks the half-bloods the best keepers, and most profitable for mutton. The grade of sheep has been improved in the county by crossing with the French Merino, and more attention seems to be paid to their keeping and comfort.

Of hogs, the most approved breed is the Berkshire, or a cross with them and the Byfield. With a good breed of hogs, making pork, to a certain extent, is profitable; they consume much on a farm, and thus convert it into a marketable article, that would otherwise, and but for them, be lost. It is thought by some that 15 bushels of corn, or its equivalent, will rear and fat a hog of good breed to weigh 300 pounds; and it is estimated that from 6 to 7 bushels will be sufficient to fat one of that size, that is in a good, healthy, and growing condition at the time

they are put up. Corn should be ground for hog feed, and, it is said, would still be better if scalded or boiled. Very little pork is packed here; it is this fall sent to New York either in the carcass, slaughtered, or on foot, to be butchered there. Price of pork in the carcass $7, and of live hogs, $5 a hundred weight. The present price of pork ought to be a sufficient inducement to procure and preserve the best breeds.

Carrots and beets are very little cultivated as field crops, though sometimes, when done, it is profitable. To prepare the ground, it requires a thorough and bountiful manuring, a loamy or musky soil does best; well pulverized, and thus prepared, may bring two crops in succession, and then be succeeded by a crop of barley or oats, and seeded to grass.

The potato crop this year is said to be under a common average per acre, but nearly free from disease. While much has been said, and many theories started and exploded on the subject of the potato rot, its causes, and the remedies, it would seem, after all, that the state of the weather at the time of the formation of the tubers, and their progress to maturity, has the greatest influence. The last spring was wet, cold, and backward, until late in June; July, August, and most of September, warm and dry. If the potato disease should subside altogether, a larger surface should be planted; they being good feed for most kinds of stock, and fitting the ground for all the varieties of grain.

Guano is not used as a manure; lime is used to some extent, and with beneficial results, especially so on clay soils. Plaster is used as a fertilizer, and, on what we call our oak lands, is beneficial to all growing crops, and should be sowed in every instance where we seed down with clover; if on winter wheat, as soon as the ground settles, and before the wheat starts in the spring; if on barley or oats, at the time they are sown. It is serviceable to the grain crop, and much more so to the young clover.

Attention is paid to barn-yard manure, so far as to keep it from actual waste. Some of our farmers have their barns and stabling so arranged as to keep it under cover; and while its benefits are admitted by all, there is a difference of opinion as to the manner of its application, especially on the wheat crop. Some plough and harrow; then apply the manure, and cultivate before seeding, for the reason that it places the seed in direct contact with the manure, and the germinating seed coming thus in contact with the fertilizer, is by this means well nourished at the very period of its growth when it most needs assistance to develop its fibres and extend its roots. The objection to this system is, that by leaving the manure thus on the surface, or nearly so, all the foul seeds it contains will vegetate, and produce a new crop with the wheat; and also that the volatile gases will escape and be lost, which, if they were ploughed under, would be preserved. In relation to the two systems, the first is probably the best in loose, spongy, and leachy soils; but in hard soils it is different—the loss there is by evaporation, and, although a top-dressing may be most beneficial to the first crop, to plough under will be most serviceable to future ones. Some of our farmers manure their meadows and pasture lands—a system of very doubtful expediency, aside from the objection of evaporation. When these fail, it is generally either that they are "bound out" (so called)—that is, that the cultivated grasses have given place to spear grass, John's-wort, or both—or is the effect of wire-worms and grubs at the roots. In either case,

they ought to be ploughed up. Meadows are sometimes ploughed after being mown, fitted and reseeded the same year, and produce a good crop the following. Some of our farmers think Timothy meadows ought not to lay longer than four years, unless they can be irrigated. In connexion with the subjects of manures is the preservation of our lands, by discreet system of rotation in crops, and the ploughing under of green ones. Clover, with its deep tap-roots, derives much of its nourishment from below, when it is necessary for the support of the other crops; and add to this its quick growth, by which the land is shaded from the sun, and the root itself, when ploughed up, is a good fertilizer. Clover, as a general thing, ought to be ploughed up in two years, and in the mean time this crop, as well as Timothy, should not be pastured too close, for what remains of either will protect through the winter and furnish a top-dressing for the succeeding one. The rotation of crops has not yet been reduced to a regular system.

Fruit culture continues to receive good attention from the farmers; crop last season was injured by frost, and, as a general thing, it was not fair. Price per bushel, 25 cents.

Of farming implements and machinery, we have nearly all the kinds and varieties. Among the reapers, Barrall's improved is said to be a favorite.

Our agricultural society was organized about twelve years since, and every year increases in interest. At the last county fair, the stock of all kinds on exhibition was much greater than at any previous one; as were also the farming implements and mechanical manufacture; the household products more than double.

Wages of common laborers or farm hands the last season, for a term of six to eight months, would range from $11 to $14 a month, and boarded. Female labor, from $1 to $1 25 a week—in some instances, $1 50.

The county of Seneca, like most of Western New York, is badly infested with foul weeds. The injury done to the various crops is estimated at from 20 to 25 per cent.; some think more. The most troublesome are the May weeds, ox-eye, Canada thistle, pigeon weed, and wild mustard. The May weed does harm to all growing crops, and will run out grass. The ox-eye is different in its appearance, but much like the May weed in its habits. Mowing often, to prevent seeding, and planting with corn, are the best means of destroying them. These weeds are supposed to have been brought here in the first settlements, either by the horses of travellers or in the grass seeds, as their first appearance was in the pasture-fields. Canada thistle was introduced in some instances with the grass seeds, but generally without a knowledge from whence it came; the seed adhering to the light down will be carried by the wind to almost any distance. Mowing will sometimes kill them, if it is done at a certain stage or flow of the sap, when they will, as is said, "bleed to death."

Ploughing frequently in a dry season is the most effectual remedy; they propagate from the root, as well as the seed, and injure all kinds of crops. Pigeon weed is injurious to wheat only, doing no harm to summer crops; it is supposed to have been brought by pigeons, as its first appearance was on the wheat stubble. The seed has a hard shell or covering, and is oily, and will lay a long time in the ground and retain its

vegetating power, as it will not vegetate during the summer months; the best means of destroying it is to plough and sow first with barley or oats, after they come off; till as for a crop of wheat, and let it lie; the pigeon weeds will then come up, which plough under and plant with corn; the next spring taking care, in tilling the corn, to prevent any of the weeds from seeding; the succeeding spring plough again, and sow with a spring crop, and seed to grass. Wild mustard, if not introduced, was much increased by the culture of flax; the seed, like that of pigeon weed, contains oil, and will lay a long time in the ground without harm; the best remedy is tillage with corn and weeding. Burdock, it is said, was introduced by the good wives of some of the early settlers, for the medicinal properties which the plant, or rather the root, was supposed to possess; the burs of this weed are especially injurious to wool. In the first appearance of the various foul weeds, the extent of their evil tendency was not suspected or understood; hence they were permitted to grow and propagate, until an effort to exterminate or check them seemed by some to be almost hopeless. The law makes it the duty of overseers of highways to cut down and destroy all the noxious weeds within their limits; but this is of little avail while they are permitted to grow on the farms adjoining. The farmers of this county are intelligent and energetic, and, when their attention is directed to an existing evil, will apply a corrective remedy. Much benefit has resulted from the agricultural society, and county fairs, not only by the competition for premiums offered, exciting a laudable ambition to excel, but more especially by the general information communicated to each other in relation to the crosses and rearing of all kinds of stock, and the mode of cultivation that produces the best crops.

In Ovid Academy, among other sciences, agricultural chemistry is taught, which by thus diffusing it among the masses is believed will have a very beneficial effect in extending the practical application of this science to the cultivation of the soil.

Very respectfully, yours,

JAMES DE MOTT.
JOHN R. YOUNG.

The Commissioner of Patents.

Gaines, Orleans County, N. Y.,
December 4, 1852.

Sir: Your Circular of August, 1852, I received from the Hon. L. Burrows. The sowing of corn for pasture, and its value as a green crop to plough under for manure, is too much neglected by farmers. I prefer it to clover for cows in milk; the butter produced from it being as hard as the hardest beef tallow in midwinter. After my cows had been feeding in the corn two or three weeks I found the butter growing hard—if possible, harder than could be produced from ice. What a pleasure to the housewife to have such hard butter in warm weather! That manufactured in the month of August is of such a nature. I think as good an article can be furnished from this as the famous Orange county butter. I should like to have a trial made by some skilful person

The increase of milk is not much more than common pastures; but the flavor imparted to the butter cannot be produced from food of any other description.

Sow one and a half bushel per acre with a drill or broadcast, as the case may be. Sow from 1st to 10th of June. I have practised this mode for the past three years to my satisfaction; and I shall, for the future, continue it. I prefer corn ploughed under to clover, for green manure. Some persons object to green corn for manure, thinking it will sour the land. I think the idea erroneous.

Very respectfully, yours,

O. M. BARBER.

PORTLAND, CHAUTAUQUE COUNTY, N. Y.

SIR: Having received your Circular, I comply with the request contained therein, not anticipating, however, that my reply to your questions will be as full as you desire for your Report.

Winter Wheat.—That section of this county bordering on Lake Erie, of about three miles wide, is well adapted to the raising of winter wheat, the quality of which is not excelled, if equalled, by that raised in any other section of this State.

The ground is seldom ploughed more than once, and, if manured with barn yard manure, it is spread on the furrow and harrowed in with the wheat. Much of the wheat is sown after oats, barley, spring wheat, and corn, and, if the land is fertile, two crops of winter wheat in succession do well. Barn-yard manure, ashes, lime, and plaster are the manures used. I am not aware that guano has been used here on any field crop. From one and a half to two bushels of seed are sown to the acre, and at all times from the 1st of September until the ground freezes; but from the 5th until the 20th of September is considered the best time for sowing. The ploughing is deeper than formerly, and is now from eight to ten inches. The yield per acre varies from twelve to thirty bushels, and will probably average twenty bushels per acre; but crops of forty and fifty bushels have been raised. The blue-stem white wheat is considered the best, both as to the product and quality, and, being very hardy, it has not been injured by the fly or rust where other varieties have.

A regular rotation of crops is not generally practised; but there are but few farmers who keep land under the plough for more than three seasons without seeding to pasture or meadow.

Spring wheat has not produced so well of late as formerly. It is raised in all parts of this county. The average price, during the last year, has been, for winter wheat, eighty-eight cents, and for spring wheat, seventy-five cents per bushel. Neither the Hessian fly nor weevil has injured wheat, to any great extent, for a few years past. I do not know of any remedies or preventives applicable for farmers, except a good, fertile soil, which sends forth a strong and healthy plant, not easily injured, and a variety of wheat that has a hard straw.

Corn is one of our best crops, on account of the grain and the fodder from the stalks, which, if well cured, are equal to a crop of hay for cattle. It is not cultivated here with so little labor as in the fertile re-

gions of Illinois and adjoining States; but it is cultivated on all land, except undrained swamps, and with much less labor than in the eastern and western part of this State. The land is ploughed but once, and the manure spread and covered. The depth of ploughing varies from six to ten inches, depending upon the quality of soil. After ploughing, the labor is mostly performed with a horse and cultivator, except where the land is very foul, and requires more dressing with the hoe than usual. From the 10th to the 20th of May is considered the best time for planting; but it is frequently planted as late as the 10th of June with success. The hills are generally from three feet to three feet six inches apart. The average crop is about forty bushels per acre. The average price the past year has been seventy cents per bushel. The season has been unfavorable for corn, especially the last planted, and it is generally supposed that the crop of this season is not more than three-fourths of the usual crop. It is now worth seventy-five cents per bushel. It is generally fed in the ear to hogs, and to cattle ground with the cob; but many do not grind it so fine, when they grind the cob, as it should be.

Oats are raised to a considerable extent, especially in the southern parts of the county, (the growing region,) where the average is about 40 bushels per acre.

Barley is raised in some sections, being considered an uncertain crop; but it frequently produces abundantly.

Of oats and barley, from 2 to 3 bushels are sown per acre.

Winter wheat does well after either barley or oats.

Hay.—The quantity of hay cut per acre varies according to the soil and season. Two tons per acre are considered a good crop. Clover and Timothy seed are the best for meadows and pastures, and a mixture of 8 quarts of Timothy seed with 4 quarts of clover, per acre, produces hay and pasturage of a fine quality, for any kind of stock. Clover hay has much dust in it, and it is supposed to be injurious to horses; but I have not known of any injurious effects from it when mixed with Timothy hay; and not having fed much clean clover hay, I cannot state from experience as to its being injurious. As the expense of raising and making hay is materially reduced by the use of horse-rakes, and also by mowing-machines, where the meadows are smooth, the hay can be cut and secured for from $1 50 to $2 per ton.

Dairy.—This business is, and for several years has been, the best agricultural business pursued, and it is increasing; but, like all other pursuits, the success depends upon proper investment and management. But very few, if any, fail of success when they have good cows and plenty of good food for them. The product of butter and cheese per cow varies materially; for, while some cows produce from 180 to 200 pounds of butter in a season, others produce only 125 or 130 pounds. The average is thought to be 150 pounds of butter, or 450 pounds of cheese; and the milk or whey is estimated at from $3 to $5 per cow for fattening pork. Butter is usually put up in firkins, of 100 pounds, and some have commenced packing in tubs of 50 pounds each. Butter is now worth 25 cents, and cheese 8 cents per pound.

Good *cows* are usually worth from $25 to $30, in the spring.

The *cattle* in this section are crosses of the Devonshire, Durham, Hereford, and native breeds, and there are some few breeds of Durham. The various breeds are too well known to require a description; but

although we have comparatively few of the pure blood, we have in this county a stock of cattle which few, if any, of the other sections of this State excel. Three-year-old steers are generally worth from $25 to $30, in the spring.

Wool-growing has been on the decrease for a number of years, which argues that it is unprofitable; but, at the prices which it has brought for two years past, together with the present price of worsted, I think it a profitable business. The French Merinos have recently been introduced by Mr. Patterson, and also by Mr. Pestrhon, of Westfield, and I have no doubt but that they will prove a source of profit to them and to the country, on account of their thick and heavy fleece.

The *Paular Merinos* are quite common here, and are a hardy sheep; much more so than the Saxon, which preceded them. Until recently, it has not been an object to raise lambs for the butchers, but it is now quite a business; and for that purpose the large, coarse sheep are considered the best. With large flocks of sheep, of fine wool, 25 per cent. increase by lambs is about an average.

Hogs.—We have a variety of breeds; some prefer one of them, and some another, and when well kept they fatten well; but if they lack good food, they soon dwindle to the common standard, and lose their identity with the breed from which they descended. I am aware that some hogs are more quiet and peaceable than others, and fatten faster with the same quantity of food; but good care and keeping for a few years have much to do in having a good breed of hogs; and while some are a source of profit to their owners, others are a loss.

Turnips and *carrots* are cultivated to some extent. Our soil appears to be well adapted to the cultivation of carrots, and they generally produce abundantly.

The *Irish potato* has been affected with the rot so much, for years past, that few were planted last spring; but, having done well the last season, we may look for an increased production next year.

The culture of *fruit* is receiving increased attention, and the railroads have opened a market that makes fruit a source of profit. All varieties of fruit cultivated in any of the Western States flourish here. The Isabella and Catawba grape are cultivated to a considerable extent; they produce well, make excellent wine, and the business being profitable, it is increasing.

The blight has destroyed many of the best pear trees, which has rendered their cultivation an uncertain business. I am not aware that any preventive has been discovered; as far as my observation has extended, the blight has not affected the pear trees growing on a clay soil so much as those on the gravel and loam. The early harvest pear has, in some locations, escaped injury, when the later varieties have been destroyed.

We have many of the choicest varieties of apples; but the Rhode Island Greening, Roxbury Russet, and Golden Russet are considered as profitable as any of the other varieties, on account of their keeping well for the spring and summer, and on account of their producing well. The Golden Sweets and Reinette Sweets are rich and profitable apples, for fall apples, and we have a fine flavored sour apple, (a fall fruit,) called the Kirby apple.

The agricultural business is improving in many respects. The land is not generally cropped until its fertility is destroyed, but the tillage and

manuring are intended to increase the fertility as well as to obtain good crops. The low and wet land is being drained and thus becoming our best land.

The stone within reach of the plough are being pushed up and laid into durable fence; and there is quite an improvement in farms and buildings, as well as in farming tools.

The railroads have given an impetus to agricultural pursuits, especially to gardening and fruit-growing.

The distribution of grains and seeds from you Office has been very beneficial. The blue-stem white wheat, the product of a small parcel sent some eight years since, is now successfully cultivated in all of the wheat-growing sections of this State, and in Canada, Ohio, Michigan, Wisconsin, and Illinois. I have been informed that in most of the sections mentioned it is fast superseding all other varieties.

I have some of the Troy wheat growing; but it does not, thus far, do so well as the blue-stem; I intend trying it a year or two longer.

Yours, respectfully,

T. JUDSON.

PARIS HILL, ONEIDA COUNTY, N. Y.,
December 17, 1852.

SIR: Having been unable to procure a copy of the last annual Report from your department, and being desirous of avoiding anything contained in my former communications, I shall confine myself in this to replies to your inquiries under the head of

Sheep and Wool.—Having been engaged in sheep husbandry for more than twenty years, I will endeavor to give the result of my experience, so far as relates to the information sought for in your Circular; and a brief review of my own experience will, perhaps, the better enable you to judge whether my *opinions* on this subject will be of value to others.

It may, however, be proper to say, at the outset, that, having generally pursued a course of what may be called *mixed husbandry*, wool-growing has never been a principal business with me, but rather an item in the general account; my flock being a small one, varying from 100 to 200, and rarely exceeding the latter number. It consisted originally of grade Merinos, averaging, perhaps, about half blood.

From this original flock my present is descended, there having been no change, except such as has been effected by what I deemed a judicious course of breeding, with a view to the improvement of the general character of the flock. By keeping this object constantly in view, I flatter myself I have succeeded in making material, though perhaps not rapid, advances. The flock now consists wholly of medium-sized sheep, compact and symmetrical in form, perfectly healthy in every respect, and yielding per head an average of about 4 pounds of fine Merino wool, of good length of staple, uniform in quality, not overcharged with yolk, and showing in opening a good crimp and lustre.

During the first years of my experience in sheep-breeding, I made use of Saxony bucks in my flock, mostly of pure blood; but, after thorough trial, became fully convinced that, although I was producing a more valuable article of *wool*, I was not in fact increasing the real value of the

flock; the improvement in the *quality* of the fleece being attended with a proportionate diminution of the *quantity*, so that, while I was enabled to obtain an advanced price per pound for a given number of fleeces, the aggregate value had in reality decreased, in consequence of the decrease of weight; I also found the animals to be less hardy—less able to withstand the great changes of our variable climate, and, consequently, much more subject to disease. A change, therefore, seemed to be necessary. This was sought to be effected by the introduction of the pure Merino blood, as distinguished from the Saxony, and for the last ten years I have used bucks of that description, to the exclusion of all others, and have reason to be well satisfied with the change.

With the Saxony sheep, the average annual loss from disease and other causes amounted to nearly 10 per cent. Since the change made in the course of breeding, the average annual loss does not exceed *two* per cent., and that arising mostly from accidental causes. I have thus become convinced that, in this locality, (it being on a range of land in latitude 43°,) the Spanish or French Merino sheep is to be preferred to the Saxony, if wool-growing is expected to be made profitable. The principal benefits I have found to result from the change are the following:

1. An increase of the average weight of fleece from about 2¼ to nearly 4 pounds.

2. Getting a close and compact fleece, comparatively impervious to the weather, and thus furnishing a more perfect protection to the body of the sheep from wet and cold.

3. Consequently a more firm and vigorous constitution.

4. And in consequence of the preceding, better breeders, and greater success in rearing the lambs.

The only offset to these advantages that I have yet perceived is a slight sacrifice in the *quality* of the wool. But a few figures will serve to show whether, in a pecuniary point of view, there is actually any loss. The account would stand thus—

2¼ pounds of superior Saxony wool, at 56 cents, is	$1 54
4 pounds of Merino wool, at 40 cents, is	1 60

showing a balance in favor of the Merino of 6 cents per fleece in the value of the wool at this estimate, which I have purposely made a very liberal one for the Saxony, having allowed more than the usual average of weight, and put the price at the highest figure any producer in this county has been able to obtain for the last clip. I have, at the same time, put the Merino at the average price paid in the summer for fair Merino wool, including all from three-fourths to full-blood. A more correct comparison would be as follows:

2¼ pounds of Saxony, at 56 cents	$1 40
4 pounds of Merino, at 44 cents	1 76

making 36 cents per fleece in favor of the Merino.

My object, more particularly during a few years past, has been to obtain, by breeding, that kind of sheep which would yield the most valuable fleece in proportion to the weight of carcass. Had I placed implicit confidence in the statements of those interested in breeding either full-blood, Saxony, or Merino sheep for *sale*, I probably should have disposed of my entire flock, and purchased those represented as possessing

the most desirable qualities. It had occurred to me, however, as worthy an experiment to attempt the breeding of a flock that should partake somewhat of the good qualities of both, and, at the same time, be more valuable for the common farmer than either—in other words, a flock possessed of vigorous constitution, and bearing fleeces superior to the Saxony in weight, and to the Merino in fineness. This attempt I have been making, and thus far my success has fully equalled my expectations. True, in two instances, I have been unfortunate in the selection of bucks. The remedy, in such cases, has been my uniform practice of making a careful division of the flock each year, according to the merits or defects of the different animals, retaining such as are nearest perfection, and disposing of all such as have prominent faults of *any* description; at the same time, making it an invariable rule *never* to allow a purchaser to make his own selection. This I consider imperatively essential to success in breeding. With these preliminary remarks, relating more particularly to my own experience in sheep husbandry, I now proceed to answer your inquiries:

1. "Is wool-growing profitable?" For a few years past this branch of business has not afforded so good profits to the farmer as the average. My opinion is, however, that the careful and judicious sheep-breeder *may* realize fair profits from wool growing, even at the average price wool has borne for the last 5 years. But unfortunately the majority of our farmers are not of this stamp. They are energetic and enterprising, it is true, but, as a general thing, are in *haste* to make money, and require immediate profits from their labor. To make wool-growing profitable, patient and continued care and attention are requisite; consequently the business has been abandoned as unprofitable by a majority of those formerly engaged in it. With the exception of occasional instances, in which the price of wool has been raised by the operations of speculators, the ruling prices, for some years past, have been considered too low to afford the wool-grower a reasonable remuneration. Our grazing lands, generally, in this county, are equally as well adapted to the purposes of the dairy as to those of wool-growing, which has probably decreased in about the same proportion.

To show that wool-growing is not generally considered profitable, I refer to the Census Statistics of 1850, as compared with those of this county and State for 1845.

In 1845, the number of sheep in Oneida county was found to be 194,589, while in 1850 the number was only 70,341, showing a decrease in five years of *sixty-four per cent.*, or an average annual decrease of more than 13 per cent. The same fact appears, in a very similar degree, in relation to most of the principal wool-growing counties of the State, as may be seen by the following comparison, viz:

	1845.	1850.
Otsego	270,642	108,241
Madison	263,132	95,308
Ontario	257,821	149,554
Washington	254,856	152,337
Chautauque	235,403	137,453
Chenango	223,452	88,811

In Rensselaer, St. Lawrence, Erie, Delaware, Yates, and Dutchess

counties, there is shown to be a decrease of half, and in Jefferson Cortland, and some other counties, there has been a decrease of two-thirds.

In the entire State, the number of sheep in 1845 was 6,443,855. while in 1850 it was about 3,453,241, being a decrease of about 47 per cent. in five years, or nearly 9½ per cent. per annum.

These comparative statistics furnish, in my estimation, the best evidence of the opinion of our New York farmers in relation to the profits of wool-growing. That it is less profitable than formerly, all are ready to admit; while at the same time they may honestly differ in opinion as to the *causes* that have operated against their interests in this branch of agriculture. Some attribute it to western competition; others to defects in, or evasions of, our tariff law. Undoubtedly each of these causes has had its influence.

The fact is apparent, that while our former tariff laws were in operation, there was a constant and gradual increase in the number of sheep kept in the State, showing, for instance, a healthy increase from 5,118,777 in 1840, to 6,443,855 in 1845, being a gain of 25 per cent. in five years, or 5 per cent. per annum. Since the latter period, and more particularly under the operation of the tariff act of 1846, the *decrease* has been in nearly a two-fold ratio. I merely refer to this as a matter of fact, and leave it for others to draw their own inferences.

2. "Cost per pound of growing coarse or fine wool." I consider that it costs *as much* to produce a pound of coarse wool as to produce a pound of fine, other circumstances being equal. In order to answer the inquiry accurately, it will be necessary to estimate the cost of keeping sheep for the year.

By the statistical returns, it appears that the average weight of fleece in this State is about 3 pounds per head for the number of sheep over one year old. This we will suppose to be a fair estimate. I suppose 3 sheep may be summered and wintered from the produce of one acre of ground. My estimate would then be as follows:

100 sheep, at $1 50 per head	$150 00
33⅓ acres of land, at $40 per acre	1,333 33
	1,483 33
Interest on this same at 7 per cent	103 83
Making and storing hay from a portion of the land	15 00
Washing and shearing sheep	6 00
Salt, tar, and summer care	5 00
	129 83

I have added nothing for winter care, as that will be considered as repaid by the manure made.

Receipts.—300 pounds of wool at a cost of about 43 cents per pound. As this is considerably above the average price of wool for several years past, the production would of course be a losing business, were it not for the annual increase of the flock, which, with ordinary flocks, does in fact furnish the only chance for a profit. This may be estimated as averaging $30 per 100 sheep.

The account would then stand as follows:

Cost of production as above	$129 83
Deduct for gain by increase	30 00
	99 83

or say 100 as the cost of producing 300 pounds wool, equal to 33⅓ cents per pound as cost of the wool to the producer. As the average price in market for a series of years cannot be put at a higher figure than 35 cents, it will at once be perceived that the producer gets only a nominal profit after deducting expenses. This I suppose to be a fair view of the case, so far as a majority of the wool-growers of this State are concerned.

It does not necessarily follow, however, that fair profits *cannot* be realized by the wool-grower, even under the existing state of things. As evidence to the contrary, I beg leave to refer to my own case, not because I am vain enough to suppose it to be the most striking one for the purpose, but because it is one of which I can speak understandingly. I find, then, my account to stand thus:

100 sheep at $2 per head	$200 00
30 acres of land at $50 per acre	1,500 00
	1,700 00
One year's interest on this at 7 per cent	119 00
Add other expenses, as in former estimate	26 00
	145 00
Deduct average increase of flock, which I find is	35 00
Leaving	110 00

as the cost of the production of 100 fleeces, averaging 4 pounds each, being 400 pounds wool, produced at a cost of $110, or 27½ cents per pound.

Estimating the value of the wool at 40 cents per pound, (and this is the *minimum* rate, as I have never sold it for any less,) it gives a clear profit of 12½ cents per pound over and above all expenses. But let us take another view of the case—

Receipts, 400 pounds wool, at 40 cents	$160
Increase of flock	35
	195
Deduct expenses as above	29
And we have remaining	169

being but a fraction less than 10 per cent. on $1,700, the amount of capital invested.

3. "Are large or small sheep more profitable, either for mutton or their fleeces?" To this I am only able to say much would depend on location, so far as the market for mutton is concerned. My own experience has shown me that a medium-sized sheep has generally afforded me the

most profit. It is, I believe, an admitted universal law, that the consumption of food by animals of the same species is in proportion to the weight of carcass. This consumption has been variously estimated at from 2½ to 3½ per cent. of their weight daily in dry hay, or its equivalent. Whatever this per-centage may be, it is undoubtedly in proportion to the weight.

Consequently a large animal consumes a greater amount of food than a smaller one of the same species. This should, of course, be taken into the account in estimating the profits. As a general rule in the animal kingdom, those of medium size are more likely to approximate nearest to the standard of perfection; and for my own use, I should certainly give them the preference.

4. "How much more does it cost to raise a pound of fine wool than ordinary coarse wool?" Answer. Not any, if the wool only is taken into the account. In the vicinity of our cities, the advantages afforded of a market for mutton may enable the grower of coarse wool to produce it at a less cost per pound than fine Merino wool could be produced at; the Merinos not being adapted to compete successfully with the coarser varieties in the mutton market. But the main dependence of the great mass of the wool growers of the country must be on the *wool* and not on the *mutton* market.

By this I would not be understood to mean that good mutton cannot be made from Merino sheep. None of these, however, should be slaughtered for this purpose, excepting wethers that have arrived at full maturity. These, with a little extra attention, will make good mutton; sufficiently fat to suit the taste of a majority of persons, and weighing, when dressed, from 40 to 50 pounds.

5. "The proportion of lambs annually reared to the number of ewes?" Answer. In small flocks of coarse-woolled sheep, the ewes of which will bring lambs at one year old, the proportion would be nearly, or quite 100 per cent., as many of the ewes might be expected to rear twins. In larger flocks of fine woolled-sheep, 80 per cent. of the number of ewes allowed to receive the male would be as high as I should venture to estimate the increase. Much, of course, depends on circumstances; the proportion varying considerably in different years. In this climate, the 1st of December is about the time the bucks are usually put with the ewes. This is generally after the flocks are arranged for the winter; and the arrangements should be made with some reference to that object.

The lambs are consequently dropped from the 1st to the middle of May. Should the spring open early, and the weather be mild and favorable, nearly all the lambs may be saved with proper attention. If, on the contrary, the season should be backward, and cold storms prevail about the time the lambs are dropped, serious losses would sometimes be experienced. Much, also, is depending on the condition of the ewes. If healthy, and in good condition, a reasonable degree of care at this time on the part of the owner will usually be well rewarded.

In a flock of 100 sheep, owing to the fact that the wethers are more likely to be selected for mutton, the proportion of ewes will generally be about three-fifths, or sixty. Of these the number suitable for breeders will be about three-fourths, or forty-five. Eighty per cent. of the latter number would give 36 lambs as the number which might reasonably be expected to be reared annually from such a flock.

I have thus endeavored to answer the several questions to which my attention has been directed by your Circular. I am aware that the opinions I have expressed may be found to differ somewhat from those entertained by others, possessed, perhaps, of judgment and experience superior to my own. But such as they are, they are honestly entertained by me, and founded on my own experience and observation. If, in communicating them, I have been able to add anything to the general fund of information on this important subject, I shall feel that I am abundantly rewarded.

I am, sir, very respectfully, your obedient servant,

LORENZO ROUSE.

To the COMMISSIONER OF PATENTS.

HURLEY, ULSTER COUNTY, N. Y.,
December 31, 1852.

SIR: In reply to your inquiries on the subject of agriculture, I answer:

On *wheat*, guano has been but little used in this county, and not at all in my neighborhood. The average product of wheat per acre does not, probably, exceed 20 bushels; but when some pains are taken to improve the soil, we can get 30 bushels, and upwards, per acre. The time of sowing is from the 1st to the 25th of September; harvesting about the middle of July. In preparing my lands for wheat, I plough but once, and that in the early part of September, turning over a clover sod, with a Michigan sod and subsoil plough, which covers up the sod entirely, and completely pulverizes the soil. My yield, the past season, exceeds 30 bushels to the acre: having measured an acre, I had 34⅝ bushels. My wheat is of the Mediterranean variety, which, with us, is the safest, it avoiding the ravages of both the Hessian fly and the wheat midge or grain-worm. The price of wheat during the last fall has been about $1 25 per bushel. I sow no grass-seed in my wheat field. My rotation of crops is, corn after wheat, and oats after corn, in which I sow my clover seed and clover sod for wheat.

Corn.—The average product of corn per acre, throughout the county, may, perhaps, not exceed 30 bushels; but on our better lands we get about 70 bushels per acre; cost of production, per bushel, about 37 cents. My system of cultivating corn is, to manure the whole ground before ploughing; in ploughing in the manure, plough about 8 inches deep; then harrow down; furrow with the plough, about three feet apart, both ways. As soon as corn-rows can be fairly seen, we work through it with a cultivator; then with plough, before hoeing. When it gets up to about a foot or fifteen inches high, we pass through again with the cultivator and the plough, both ways; then finish hoeing by about the time the spindle-top comes out. The best mode of feeding is undoubtedly that of cooking; but very little of this is done with us. The profits of corn-stalks, as fodder, are not fully appreciated by most farmers. The proper way of managing them is not to cut them till they are quite ripe; but, as soon as ripe, cut and shock them, so that they may become dry before husking the corn. They ought not to be brought in before they are fully dry, when they will be the best of fodder. And when feeding them, another great mistake is generally made—that of throwing out too much

at a time; by throwing out or feeding rather sparingly, cattle can be made to eat the whole of the stalk, which they will not do when more is given. The reason why corn stalks should not be cut too early, is, that when they are cut before fully ripe they will become acid, and the saccharine matter contained in them will become vinegar instead of sugar; and, consequently, much of the nutrition contained in the stalk will be lost; and, of course, cattle will not do well by feeding on them.

Oats.—The average crop of oats per acre, in this county, does not exceed 30 bushels; but, on our best lands we may average about 70 bushels; and extra pieces give from 90 to 108 bushels per acre.

Rye yields no more than about 15 bushels per acre throughout the county.

Potatoes have, for a number of years, been a very bad crop. The past season has been an exception to the general rule: we have this year a good crop of potatoes. I planted more than an acre in the yam variety, from which I have 473½ bushels to the acre. They were very little affected by the rot; and were raised on corn-stubble of last year, which was well manured with barn-yard manure and ashes. Except for the potato crop, no manure was used the past season. The land was ploughed about 8 inches deep, and planted in hills about 3 feet apart. Expense of ploughing, hoeing, and gathering, the acre, about $20—the potatoes now selling for 41 cents per bushel. Of this variety I had about 50 per cent. more than of any other which I had planted.

Yours, respectfully,

PETER CRISPELL, Jr.

To the Commissioner of Patents.

Arkport, Steuben County, N. Y.,
December 25, 1852.

Sir: It is with much pleasure that I proceed to make to you, in conformity to the Circular issued by your predecessor, a report of matters relating to the agricultural interests of this vicinity.

I have delayed doing so till this moment, not from any want of interest in the subject, or the most entire willingness to comply with your wishes, but in hopes of being able to furnish more accurate or reliable information, and a greater variety of details.

Certainly there is nothing which at present more demands the fostering care of government than the subject of American agriculture, and it is truly lamentable how little of that care it receives.

I shall endeavor to answer the Circular only in regard to the subjects with which I am most familiar.

Wheat.—Much more attention is being paid to the production of this staple crop than formerly, and farmers are beginning to find out that it can be raised successfully on something else besides "new land," and that, by proper tillage, the soil is actually growing *better*, instead of *poorer*, in its culture. The usual course pursued here is to "summer fallow" in June, turning under a good coat of clover; plough about 7 inches deep; harrow thoroughly, and cross-plough just before sowing. We usually sow in the last days of August or first of September, at the

rate of two bushels per acre. The seed should be previously soaked for twelve hours in strong brine, and then coated with unslacked lime. We use the "Soule" wheat, thinking it will yield five bushels per acre more than any other variety known with us. The average product is about 25 bushels per acre. The quantity of land sown, and the average product per acre, are steadily *increasing*. The average price for the year 1852 has been about 94 cents per bushel We are not troubled with the "Hessian fly" or "weevil." In seeding down, red clover usually follows wheat. Sow the last of March or first of April, at the rate of ten quarts per acre. And I would here remark, that we invariably have the best success when we sow the seed in the chaff. The covering of the seed seems to afford protection during the late frosts of the spring months. It must be sown *early* to do well Sow on the snow if possible, as you can then distribute the seed more evenly. "Guano" is not used with us for anything.

Indian Corn.—This valuable crop, which makes the farmer's fields look so rich at harvest time, lays such a solid foundation to his pork, contributes so essentially towards furnishing a supply of warm doughnuts, and loads his table with such healthful and delicious puddings, has, we are happy to say, notwithstanding the unpromising attitude of spring, received increased attention, and been full an average crop the past season. When planted on soil that is suitable, and properly cared for, the average yield is about 50 bushels per acre. Cost of production, including interest on land, about 40 cents per bushel, as follows:

Interest on land, per acre	$5 00
Ploughing once, per acre	2 00
Harrowing	1 00
Seed and planting	1 00
Ashes, putting on the hill	1 00
Cultivating and hoeing	5 00
Cutting up	1 00
Husking and thrashing	3 00
Securing stalks	1 00
	20 00

In this estimate I have made no account of the manure, (20 loads to the acre.) The stalks are worth, well housed, about as much per acre as a moderate crop of hay to feed cattle, besides adding very materially to the next year's supply of manure for another crop. Our best crops of corn are raised on sward ground, ploughing it but once, and turning the upper side perfectly under; plough as deeply as possible, not less than *eight inches;* then harrow lengthwise the furrow until a good tilth is produced. Mark three and a half feet each way, and plant about the 10th of May. As soon as the corn is of sufficient size, start the cultivator, and have a boy follow to see that there is none covered. Immediately after, put half a handful of unleached ashes on each hill. In about a week go through with the cultivator again, each way; follow with the hoe, and thin out the stalks to four in each hill. Cultivate and hoe again before tasseling. This will eradicate all weeds, and is all the attention it requires till it becomes glazed, when it should immediately

be cut up and set in shocks of 25 hills each, and bound firmly round the top with stalks. Husk in October. As soon as the stalks become perfectly dry, draw them in and scatter them around as thin as possible in the barn and shed loft. If well secured, they are better than hay for milch cows. The new crop of corn is now selling readily at 75 cents per bushel.

Oats.—The raising of this crop is considered a money making business at present prices. Average yield about 60 bushels per acre; worth from 40 to 50 cents per bushel. It is probably the most exhausting to the soil of any crop we raise. Sow in April, at the rate of three bushels per acre.

Barley.—This crop is raised to a considerable extent on good wheat lands. It leaves the soil in a fine state for wheat. Average yield about 30 bushels per acre, and commands 70 cents per bushel.

Rye.—But very little sown; it does not pay. Average yield say 15 to 20 bushels per acre; worth about 60 cents.

Peas and Beans.—Peas are considered the least exhausting to the soil of any crop we raise. Sow from three to four bushels per acre; and if the bugs do not injure them, they are a very profitable crop. Average yield about 20 bushels; worth from $1 to $1 50 per bushel.

Neat Cattle.—The cost of raising neat cattle till three years old will not vary much from $15. In this estimate I have supposed them to be kept (after the first winter) on coarse fodder, straw, corn-stalks, &c., with hay in the spring. At that age they are worth from $15 to $25. *Good* dairy cows are worth, in the spring, $30; in the fall, from $16 to $20. I have never ascertained by weight how much beef or pork 100 pounds of corn-meal will produce.

I have thus touched imperfectly on some of the points suggested in your Circular. If they should be of any service to the Commissioner of Patents in making up his Annual Report, I shall be highly gratified.

Respectfully yours,

JOHN HURLBUT.

VAN BUREN, ONONDAGA COUNTY, N. Y.,
December, 1852.

SIR: Your Circular of August last was put into my hands, and I will briefly reply to a few of the questions contained therein.

Wheat.—This crop is mostly grown after oats and barley. The most common practice is to plough, as soon as the crops are harvested, from six to eight inches deep; the latter depth is considered best. Barn-yard manure is applied broadcast, at the rate of from twenty to thirty-two horse-wagon loads per acre; but a great part of our wheat receives no manure, from the fact that much is wasted, and, frequently, large quantities left in the barn-yard—a bad practice, indeed, but true, nevertheless. About the firs tof September the two-horse cultivator, or in some cases the harrow, is started, and, after a good stirring, it is considered ready for the seed, which is sown about the 10th, followed by the harrow and a few furrows to carry off water from such places as will be likely to be injured in wet weather. This finishes the work; but, in some instances, summer fallowing is still practised, which is commenced

about the middle of June, and consists of two or three ploughings and harrowing. This practice was formerly considered the only sure mode of wheat-growing, and good crops are still grown in this way; but, when the expense and loss of time are taken into consideration, most farmers are of the opinion that sowing after summer crops is most profitable. Another mode of wheat-growing is to turn over a clover-lay in the month of August; work it well with the cultivator, and harrow and sow at the usual time. This has never been extensively practised in this vicinity; and although there have been some good crops, there have also been many failures. The usual quantity of seed is about two bushels per acre. Harvesting commences about the 20th of July, and the yield is from twenty to thirty bushels per acre. The last harvest was about one third less. I have never found any remedy for the weevil or Hessian fly, nor have I in forty-three years seen any diminution in quantity or quality, except what was clearly to be traced to unfavorable seasons. It is a fact that, at this time, the oldest fields produce the best crops. The average price is about one dollar per bushel. It is usual to sow clover and Timothy on wheat, at the rate of ten or twelve pounds of the former, and six or eight of the latter, per acre; this is done in the spring, as soon as the snow is off—most commonly in the month of April.

Corn.—We prepare the ground by one ploughing, six or eight inches deep; the cultivator or harrow follows, in order to mellow the surface; but following the same direction with the plough. We mark with a simple instrument, drawn by a horse, which makes three or four marks at a time; the widths are from three feet two inches to three feet nine or ten inches each way (the former I consider best;) and we plant from the 15th to the 25th of May. As soon as the corn is fairly up we start the cultivator, going through once in a row; this completed, we commence across the rows, and follow with hoes, cutting out weeds and thinning the plants, if there should be more than is necessary—four is thought to be about the proper number. The cultivator is continued, and a second, and in a few instances a third, hoeing is done; but little earth is put round the plants. Hilling has become unfashionable, as well as unprofitable; but the cultivator is now the great laborer in the corn-field. It is cut up about the middle of September, and the husking is done as soon as it is fit—generally in October; and the yield is from forty to seventy bushels per acre, at an expense of fifteen to thirty cents per bushel. It has been grown for twelve and a half cents on good land and with good culture. The usual price is about fifty cents per bushel—sixty-two and a half at this time. I have no experience in feeding.

Oats and Barley.—These crops usually follow corn. Barley is sown as early as the ground can be fitted, one ploughing being sufficient sometimes, where barley follows wheat. The ploughing is done in October or November; but this is not so much practised as formerly. As soon as the soil is dry enough it is sown, two and a half to three bushels of seed to the acre—the two-rowed is preferred—the ground well harrowed, and sometimes the roller follows. It is cut about the 25th July with a cradle, and sometimes with the naked scythe, and when sufficiently dry it is thrashed with a thrashing-machine. The usual yield is from twenty to forty bushels per acre; price the present season sixty-two and a half cents per bushel. In some seasons it has been lower, and in a few instances higher. Oats are sown as soon after

barley as the ground can be fitted, with two to three bushels of seed per acre; the whole operation being the same as for barley. They are cut with the cradle, and bound and mostly thrashed by hand in the winter. The yield is from thirty to sixty bushels per acre. The present price is forty-three cents per bushel, which is eight or ten cents above the usual price at this time of year.

Fruit.—There is an increasing attention paid to the cultivation of fruit. Several years ago orchards were cut down, being considered as "cumberers of the ground;" but of late years better counsels have prevailed, and large numbers are planted every year, and will probably continue for many years to come. It is now the opinion of good practical farmers that for feeding, particulady to swine, there is no crop that pays better, according to its cost, being fully equal to potatoes by measure, whilst the expense is not more than three or four cents per bushel. Hogs fatten well on fruit; so do cattle and horses. I feed them raw, and consider them as good as though they were cooked—indeed, from my own experience, I have found but little benefit in cooking food for animals; nature appears to have provided them with the necessary apparatus both for grinding and cooking, and art can add but little to it. I am now feeding horses, cattle, and swine, on raw apples, and they do well on them. The best winter fruit, taking all things into consideration, is the Greening, Swan, Russet, and Spitzenberg. These have the preference; but the Northern Spy is now the rage, and, should it succeed as well as present appearances indicate, it will soon be the *prince* among apples. It is much cultivated, and for beauty, durability, and fine flavor, is not exceeded by any apple with which I am acquainted.

Pears, peaches, cherries, and plums, are also cultivated to a considerable extent; but the latter are attacked with some disease or animal, I know not which, that has prevented the cultivation, and nearly destroyed the whole of the trees, and no remedy has yet been found. Peaches, pears, and cherries, are grown to a considerable extent; but our cold winters render peach-growing a rather doubtful business. The *yellows* is unknown among us. We transplant in the spring, the latter part of April or first of May.

Manures.—We use plaster, which is abundant in our county, and worth at the mills about $1 50 per ton; it is sown in April or May, at the rate of a ton to ten or twelve acres, yearly, on clover and other grasses. I have not found any benefit by using it on grain, although I have tried many experiments; but on clover and other grasses, and a dry soil, the crop is frequently doubled. Nor is there any danger of using large quantities. A bushel to the square rod has been applied with decided advantage, which continued to operate for several years, without any other application. We make, too, large quantities of barnyard manure, which of late years has been used with a little more prudence than formerly, when it was the fashion to compute the expense of moving the barn or the manure, and very frequently the barn was moved, as the lightest job; and this was only done when the cattle were likely to mire in the dung. We have done a little at tobacco-growing, which draws largely on this bank; and it appears to be absolutely necessary to remove these deposites, or have a light crop; and should we continue this branch of business, we shall be compelled to draw out the manure and let the barn stand.

There is no regular system of rotation practised among us, each having a system of his own, and many no system at all. I will give my own, which is also practised by a few others. I will commence with a green sward: first year, corn; second, oats and barley; third, wheat, with clover and Timothy seed; fourth, mow the first crop for hay—the same season, a crop of seed; fifth and sixth, pasture. Plaster is applied each year while in clover, and the crop of hay is usually from one and a fourth to two tons per acre; the clover-seed from one and a half to two bushels per acre. The expense of getting in hay is generally about one dollar and fifty cents per ton; but to all these estimates should be added the interest on the price of land, at sixty to eighty dollars per acre, and taxes, which are increasing at a rapid rate.

Your humble servant,

JOHN BOWMAN.

PAVILION, GENESEE COUNTY, N. Y.,
December 21, 1852.

SIR: The Circular requesting agricultural information was duly received, through the politeness of Hon. A. P. Hascall, and I have hesitated to reply on account of my limited information; but such as I can give, is cheerfully submitted to your disposal.

Wheat.—The most common varieties are the Soule, Blue-stem, White-flint, and Mediterranean, and they are generally preferred in the order named; though each kind has its friends, depending upon a more perfect adaptation of soil to a particular variety, and consequently their success with it. The Soule requires a rich soil; the Blue-stem and White-flint will succeed on rather poorer soil; the Mediterranean is a coarse, hardy wheat, and not raised much on our fine wheat lands, but is chiefly used on soils where the other kinds would be likely to winter-kill; and as its market value is less, it is not much of a favorite. No guano is used in this section, to my knowledge, in the production of wheat. I judge the average product this season to be 22 bushels per acre; though some fields have yielded from 40 to 50 bushels per acre. Time of seeding, from the 15th of August to the 15th of September; the kind of soil and weather indicating more definitely the time of seeding. Harvested this season the latter part of July. The preparation of seed is by a thorough cleaning and separation of small shrunk wheat and foul seed, with the fanning mill; 2 bushels per acre is generally used in sowing broadcast; 6 to 7 pecks in drilling both ways, (crossing the field the second time at right-angles with the first drilling,) and 5 pecks is considered sufficien in drilling one way. The usual method is, to plough grass land but once, from six to ten inches deep; the after-cultivation being done with the harrow and cultivator. Stubble land is sometimes ploughed twice. The yield per acre, in some localities, was larger than usual the past season, and, as a whole, I think the yield increasing. In the spring the ground is seeded with clover, and it remains two or three seasons as pasture or meadow. If the clover is grown as a renovating crop, it should be ploughed under the second season; or if the preceding wheat crop has been injured by worms, it should not remain long, as frequent working of the ground will destroy them. Some practise sowing Timothy seed in the fall, im-

mediately after the wheat, though a more common one is with the clover in the spring. Less Timothy is used on wheat soils now than formerly; the objection to it is, that it exhausts the soil, or appropriates to its own use elements that are essential to the perfect growth and maturity of the wheat plant; and that it serves to perpetuate wire worms, as they are more liable to injure the succeeding crop, where Timothy is used. For the Hessian fly I know of no better remedy than to keep the land rich—not exhaust it with spring crops; prepare it well, and sow at a proper time; give it room to produce rank and vigorous stalks; upon such, flies do but little injury. Sowing near or after the middle of September is considered a preventive, as the season for depositing their eggs has passed, which is usually the last of August or first of September; but on some soils, if sown late, so as not to germinate before the last of September, the injury from the winter and the rust or mildew, of late-sown wheat, would equal that of the fly in the fall, aside from its liability to be attacked in the spring. The weevil has done us no injury yet; a very few were found in this section the past season. The average price at the nearest market (Le Roy) has been 90 cents per bushel.

Corn.—The cultivation of this important grain is on the increase. The most esteemed varieties are the eight-rowed yellow, red-blaze, and Dutton. No guano is used in this section in the production of corn. The average product per acre varies much, some farmers getting 25, others 45 or 50 bushels per acre; an average would be not far from 30 bushels per acre this season. To produce an acre of corn will cost at least $12, if interest on land is included. This fall new corn has sold at 50 cents per bushel. Cost of production on this estimate, 40 cents per bushel: 30 bushels at 50 cents per bushel, would be $15—stalks $4; this would leave a net profit of $7 per acre. The usual practice is to plant on grass land, manured with 12 or 15 loads of good barn-yard manure to the acre; though some depend upon the stimulus of a fresh-turned sod, reserving the manure for wheat land. Plough deep, the first of May: harrow it fine; mark it for rows both ways, 3½ feet apart; plant about the 20th of May, from 5 to 7 grains in a hill. If the ploughing and harrowing have been thorough, the after-cultivation may be done principally with the cultivator and plough, leaving but little work for the hoe. Ashes, lime, and plaster, mixed and sprinkled upon the hills just before or soon after it appears out of the ground, is considered beneficial; if injury from the wire-worm is apprehended, salt is sometimes added. In feeding hogs it is esteemed best to have the corn ground and cooked, or cooked if unground; dry unground corn will increase nearly one-fourth its bulk in cooking, though a common practice is to feed it raw and unground (it is less trouble)—for cattle, ground, but raw. I have no experiment by which to judge of the increased quantity of grain per acre which the manure of 10 bushels of corn consumed by hogs would make, but think it might be 4 or 5 bushels.

Oats are considered an exhausting crop, and are less cultivated than formerly; average yield under ordinary circumstances, 25 bushels per acre: in favorable seasons they will yield from 40 to 45 bushels per acre; 40 cents is the average price. Land ploughed but once. Sow from 2½ to 3 bushels per acre.

Barley is cultivated to some extent; is not so exhausting as oats; it requires a light soil, with a good supply of vegetable matter; 20 bushels

may be considered an average yield, and 60 cents an average price per bushel; quantity sown 2 to 3 bushels per acre.

Rye is not cultivated.

Peas but little cultivated as a field crop, though they are not so exhausting to land as others. They are not cultivated as a renovating crop, though I think they would be a good preparatory crop for wheat, on clay and sandy soils, that are lacking in vegetable matter, if turned under with the plough, or suffered to decay on the surface.

Beans.—Their cultivation, I think, is on the increase. Price this season at the nearest market, $1 per bushel; average yield 18 to 20 bushels per acre. They are exhausting to land, as the harvesting removes the stalks, which are rich in the most valuable elements of the soil.

Buckwheat is raised to some extent; time of seeding about the 20th of June; quantity of seed from ½ to ¾ bushel per acre. The past season was unfavorable to its filling. The yield was not large—probably 20 bushels would be an average; price, 50 cents per bushel. If grown as a renovating crop, it should be sown early, and ploughed under while in blossom.

Millet was introduced into this section the past season; how extensive its cultivation will be, I cannot say. It is an exhausting crop, but valuable. If cut when in blossom, though the seed would be valueless, it would produce a number of tons per acre of fodder, as valuable as some of the grasses. Millet seed is rich in nutritive elements. It is also productive; when properly tilled, it is said to yield 65 or 70 bushels per acre. When fed to cattle or horses, it should be ground. Time of seeding, from the 1st to the 15th of June, 8 or 10 quarts of seed per acre. Price, $1 25 per bushel.

Clover and Grasses.—The past season was not so favorable for grass as others have been; probably 1¼ ton per acre would be an average. Plaster is the principal fertilizer used for meadows and pastures. In laying down meadows, clover and Timothy are the only grasses used; from 6 to 8 pounds of clover seed, and 6 to 8 quarts of Timothy, per acre. The cost of growing hay, exclusive of interest on land, would be from $2 to $2 50 per ton. My experience in feeding clear clover hay to horses commenced this fall. The hay appears dusty, and the horses cough some; I attribute it to the dust, but cannot say whether it will prove a permanent injury or not. Perhaps the fault was in curing the hay.

Dairy husbandry is not pursued here to much extent; it is a secondary object, farmers consuming from one-half to three-quarters of their dairy products in their own families. A cow will make from 150 to 200 pounds of butter in a year. Average price of butter the past season, 15 cents.

Neat cattle are raised to some extent by farmers generally; and although a too common practice is, and has been, to keep them on cheap and coarse fodder, yet the actual cost of rearing until three years old has not been much less than $20; an average price at that age is from $25 to $30. Good cows sell in the fall from $20 to $25; in the spring, from $25 to $35 and $40. Cannot say how many pounds of beef 100 pounds of corn would produce. A given amount of food will produce more meat in a Durham or Devon, than in a native animal. There are no Herefords in this section. The interest in rearing cattle is increasing. Within the past season some of our enterprising farmers have obtained as fine specimens

of the full-blooded Durham as any section can furnish. The breaking of steers to the yoke is a rare occurrence; but when attempted, it commences the first winter, by yoking them occasionally, and driving sufficient to accustom them to the yoke and make them gentle. But few oxen are used on farms, and most of them are taken from Western droves, or the adjoining southern counties. Our cattle are principally intended for the shambles.

Sheep and Wool.—Considerable wool is grown here. At our nearest market (Le Roy) over 92,000 pounds were bought; one firm buying over 80,000 pounds, at an average of 38½ cents per pound. The amount bought by that firm was less by 50,000 pounds than in some previous years. The clip was not less, but more wool the past season was sent to other markets. Most people consider wool-growing profitable; but as opinions are various respecting sheep and wool, and the comparative profit of growing fine and coarse wool, both wool and mutton being considered, I am under the necessity of leaving answers to the proposed questions for those more experienced in wool-growing and rearing of sheep.

Hogs.—New varieties are frequently introduced, but are so soon mixed up, that it is difficult to determine which are the best. A cross of the Byfield and the Leicestershire is generally preferred. Hogs are allowed to range over the pasture-fields and orchards during the summer, and with the milk and slops from the kitchen, thrive well; in the fall they are confined in pens and fed on apples, potatoes, and pumpkins, boiled together in such proportions as our supplies of each will admit, adding meal after boiling—afterwards fed on corn, until time of killing. In packing pork the Onondaga coarse salt is generally used, though some prefer rock salt, from the idea that it preserves meat better. As salt contains water mechanically confined within its crystals, the only source of danger in using it is in its dampness. "Wet salt is entirely unsuitable for preserving animal substances, inasmuch as the principal operation of salt as a preserver is due to its power of absorbing water from the material preserved." [The idea advanced that "wet salt" is injurious to pickled pork, or any meat, is unsound.—Ed.] And if the Onondaga salt is thoroughly dried, its preserving qualities are equal to any foreign salt. There is no bacon made. Hams are cured by moistening them with saltpetre water, then rubbing them with hot salt two or three times in the course of two or three weeks, or by packing in tight casks and covering them with strong brine, letting them remain four or five weeks, then smoking them with sugar-maple chips, or, what is preferred by some, corn cobs; afterwards kept in a dry cool place until used. Cannot say how many pounds of pork 100 pounds of corn will make.

Potatoes are cultivated generally, though the yield has not been large; 100 bushels is probably an average per acre. The preparation and tillage the same as corn. The round and long Pink-eye and Mercer are considered best for table use, and are as profitable, though not so prolific, as some other varieties: Best system in planting is in drills from two and a half to three feet distant, and from eight to ten inches in the drill, one piece in a place; a light rich soil, free from clay, is best. If manures are used, they should be fine and well rotted; coarse and unfermented manures are considered injurious. During the prevalence of the potato disease, we lost none that were grown on a loose black soil, (re arranged drift, filled with vegetable matter;) but where the subsoil, a light, argillaceous

earth, (but not a tenacious clay,) was brought to the surface by the plough, and in levelling the ground, they were much affected apparently in proportion to the amount of clay mixed with the surface soil. No manures were used.

Fruit Culture.—For years there has been considerable interest in, and attention paid to, the cultivation of apples, which still continues; and attention to the cultivation of choice varieties of other fruits is increasing. For late keeping and spring markets, Russets are preferred; Pippins, Talman Sweeting, Greening, Spitzenberg, are some of the common, but good varieties for winter use. In my estimation, there can be apples enough grown on an acre of ground, allowing them to be good natural fruit, to make it profitable to the farmer, as food for stock; if choice varieties are grown, the amount of profit would depend much on location and market. For a number of years we have fed our apples to hogs, considering them equal to potatoes in fat-producing properties.

Root Crops, (turnips, carrots and beets.) In this immediate vicinity they are not much cultivated, yet they are favorably spoken of, and many propose raising, in future, an additional quantity. Average product per acre, cannot say; though a gentleman in the habit of raising some acres of the sugar-beet, each year, informed me they would yield 20 tons per acre. The tops he considered excellent for feeding cows; and I suppose, in his estimated yield per acre, the tops were included.

Answers to some questions proposed are omitted, as I could obtain no definite information as answers. Farming is not pursued with that system and regularity which might be desired. Wheat has been the great staple article in this section, and has received the principal attention of farmers: for years it was almost their only cash article; but lands becoming worn, requiring in some respects a different course to be pursued in its production, the facilities for transportation increasing, thereby furnishing a market for other farm products, the diffusion of agricultural and scientific knowledge is breaking up this exclusiveness and introducing more variety upon the farm, as well as system and economy in its management Though as for debt and credit, or, in other words, the actual cost of farm operations, this is yet a matter of mere conjecture with many; but if the past is a criterion by which the future can be judged, the careless system heretofore pursued will soon be among the things that are past; and with the stimulus to exertion, of a good market and remunerating prices, agricultural productions will be greatly increased.

Very respectfully, yours,

J. L. CROCKER.

To the Commissioner of Patents.

Fredonia, Chautauque Co., New York,
December 24, 1852.

Sir: Having for the past twenty years had in constant employ from 20 to 30 horses, I have been led by experience to believe that red clover hay, fed to horses in the usual manner, is injurious, and many times creates a cough and the heaves. It may be fed in small quantities when *wet* or *soaked* in water, without injury.

It undoubtedly makes much difference in the manner clover-hay is made, as it never should be spread, and remain so, until thoroughly dried, but wilted and cured in the cock; and when put into the mow, a little salt applied will tend to keep it in a state in which the dust will adhere to it, and not rise when fed, which I think is the greatest cause of injury.

I am of the opinion that too much hay, of any kind, is not so good for a horse as a smaller quantity of hay, and the balance of nourishment, to keep the horse in condition, in oats. A hearty horse will eat from 25 to 35 pounds of hay in 24 hours; and to keep him in condition to work, 12 or 16 quarts of oats must be added. One-third of that amount in hay, and the worth of the other two-thirds of hay added to the oats, will fit a horse much better for labor, endurance and activity; and a horse fed in that manner, is seldom troubled with the heaves.

Potatoes.—The two best kinds of potatoes I have ever raised in this section, are the early June (a round, white potato) for summer use, and the long, flat, white Pink-eye for winter. The black Pink eye is nearly equal to the white, and I think not quite so liable to rot. The blight or rot in the potato, the past season, in this section, has been hardly perceived. I have not seen in my crop a diseased potato, when for three or four years previous I hardly saw a sound one. It has been a vexed question to the farmer, and if, as some have thought, the blight proceeds from an insect, did not the severe cold winter of 1851–'52 have something to do with the favorable change in the crop? Mercury fell to 12 or 13° below zero here. All kinds of insects which infest plants were almost extinct in this section the past season, such as turnip fly, striped bug, the large black beetle-bug, grasshopper, &c., &c.

Yours, respectfully,

L. RISLEY.

FREDONIA, CHAUTAUQUE CO., NEW YORK,
January 1, 1853.

DEAR SIR: The culture of fruit in western New York is fast gaining ground, particularly so far as quality is concerned; as for profit, the fruit crop is one of the first, taking the cost into consideration. Many farmers and amateurs are setting young orchards; and most persons in this vicinity are learning better than to go to a neighbor's orchard and dig up sprouts to form an orchard, or to run here and there to get scions of nameless kinds of fruit. I can best illustrate my meaning by stating my own experience in establishing a small fruit orchard. About twenty years ago I commenced to plant an orchard; and intending to have a choice collection, I got most of the trees and grafted them myself, so that I might *know that all was right.*

Having no regular nursery near, I spent much time to pick up scions for a *good collection.* My neighbors were all very kind, and gave me scions of their *choicest* fruit, calling them by names they had dubbed them with themselves, such as "Queen Ann," "Victoria," "Nine-pounders," "Signifieders," and all sorts of large-sounding names, known to nobody but themselves. Well, I grafted about sixty trees with about

thirty of the choice varieties, and labelled their names, and sat down to wait for the bearing. Four years came round, rather slow in that time of my life; but nevertheless it did come round, and the fruit too, when I was not a little disappointed to find nine or ten trees of one kind, and nine or ten of another, and so on, until the varieties were reduced to a few kinds, and a good share of those quite common. I marked the trees and commenced the next spring to saw off and graft over. The next time, to be sure, I purchased the scions of a pedler, who had a few more of his very choice kinds than he had promised to Judge Somebody and General Such-a-one. I put in the scions, and again satisfied my patience with a foretaste of fine fruit in anticipation. Four or five years more passed; and when they again bore fruit, I found that I had not changed half of my trees, but had again put in the identical kinds that I had cut off. The pedler had cut his scions where most convenient, and gave names that answered well until they bore fruit.

The third time, after losing ten or twelve years, I applied to a nursery man of reputation, who sold trees and scions true to the mark, and I am now just beginning to reap the benefit. Pomological conventions and societies are doing much to sift out the best varieties of fruit, and persons selecting fruit from the kinds they denominate first-rate will not be disappointed.

From the varieties of winter fruit I have in bearing, I should select as the best the Northern Spy, Swan, Rhode Island Greening, Hubardson None-such, Westfield Seek-no-further, Monmouth or Red-cheek Pippin, and Vandevere.

Very respectfully, yours,

L. RISLEY.

To the Commissioner of Patents.

New Haven, Oswego Co., New York.,
January 1, 1853.

Sir: The culture of fruit is receiving increased attention in all this region, particularly in the counties bordering the shore of Lake Ontario. This region is very well adapted to the culture of fruit, on account of its proximity to the lake, whose waters becoming heated during the summer, modify the severity of the autumnal frosts, and thus prolong the season for the ripening of our fall and winter fruits; and, on the other hand, the cold north March and April winds retard the opening of the blossoms of our fruit trees until past the period of spring frosts; thereby rendering the climate congenial to the propagation of those fruits cultivated in the Northern States. Among the fruits cultivated here are apples, pears, peaches, quinces, apricots, and nectarines; and of the small fruits are, plums, cherries, grapes, gooseberries, currants, and strawberries. Apples are, however, the principal fruit depended upon for sale and exportation. Large quantities are annually sent to the seaboard towns, Canada, and the Western States. Buyers are always sure of finding a surplus here when the crop fails East or West, or in the interior of the State, as it frequently does; while here it may be considered a sure crop. I believe there has not been a total failure here for the last twenty-five years; but we have had a supply for our domestic wants

and more or less to spare. The varieties best to keep for winter use are, the Esopus, Spitzenberg, and Rhode Island Greening, which latter is a fall fruit in the Southwestern States, but is peculiarly adapted to this locality—always fair, and an almost constant bearer, ripening some ten or fifteen days later than in Western New York, and keeping from January to April or May, and in some instances still later; the Westfield Seek-no-further, Holland Pippin, and Swaar. The later keeping varieties are, the Baldwin, Roxbury Russett, and Northern Spy. All of the above are among our best varieties for exportation. The Newtown Pippin has not been sufficiently tested with us to enable us to speak of its success with confidence; it is hoped, however, that it will succeed upon our sandy loam soils. The pear has not received that attention with us heretofore which it deserves, as a profitable fruit for cultivation. I know of no investment of money, in an agricultural point of view, that bids fairer to be profitable than the planting of pear orchards, consisting of the best market varieties of that fine fruit. One hundred and eight trees, 20 feet apart, can be set out on an acre, which, when fully grown—suppose them to bring half the present price—would amount to tenfold more than any crop of grain, grass, or roots, which we can now cultivate upon the same quantity of land. The blight in the pear tree, which has proved so destructive in many regions, has probably deterred many from going into the cultivation extensively. We have not suffered very much from it here. In addition to the old remedy of cutting off the limb below the part apparently affected, some cultivators here have placed leached wood-ashes around the base of the tree, to the amount of one bushel to a large-sized tree, and in like proportion for smaller trees, with apparent good success. I have tried the same remedy, with an addition of a small quantity of iron filings or blacksmith's forge cinders, and have not had my trees affected with the blight, "leaf or limb." Whether those remedies have been a preventive or not, I cannot say. There has been a little of the blight upon the apple tree and upon the quince here, killing the ends of the branches affected and withering the fruit upon the affected part, but producing no very serious injury.

To your inquiry, "Cannot apples enough be grown on an acre to render the crop a very profitable one to the farmer?" I would say that next to the cultivation of the pear, would be the cultivation of the apple, on the score of profit.

Possessing, as we do, a somewhat barren, at least an inferior soil, when compared with the best wheat lands of Western New York, and the rich prairie bottoms of the western States, and although a calcareous soil is considered the best for the cultivation of the apple, yet we have one next to it in goodness in that respect—a gravelly, stony, and sandy loam; and together with the climate, as before stated, I think we can successfully compete with most any other region in that department. I would not recommend the course too often pursued by the early settlers of a country, or those planting the first orchards on their farms. I mean the setting of trees one rod apart, or 20 or 25 feet apart, and these of uncultivated or common fruit, and the rows running in zigzag directions. Orchards answering the above description can be seen by a few miles' ride in almost any direction in the country. Their owners undoubtedly were anxious to get fruit a growing, and sought such trees as were the most easily obtained, which were usually seedlings, on which they probably intended

to graft some good varieties; but for want of knowledge how to perform the operation, means to hire it done, being too busily engaged in some other needed improvement upon the farm, or for some other reason, they have been neglected until too large, or too old. To remunerate the expense of working them, they are suffered to remain cumberers of the ground, and eclipsing the same, so that nothing can be cultivated under them, bearing occasionally a small crop of little scurfy apples, covered with a crust of fungi, and so small as hardly to be worth the gathering, provided the limbs were thinned out sufficiently for one to mount the tree to shake them off, for they certainly would not be worth the picking.

In setting an orchard I would select thrifty and, at the same time, hardy varieties, grafted on budded trees of four or five years' growth, and from seven to ten feet in height. I should prefer them worked near the ground on seedling stocks, on the crown of the same, instead of root grafts, as they are usually furnished with a greater number of lateral roots, and are more stocky. I would set them out after the quincunx method, two rods apart, by commencing a row on one side of the field—say one rod from the side or fence—and set them just two rods distant from each other by means of a two-rod chain or pole; commence the next row by setting the first tree two rods distant from the first two trees in the first row, thus forming an equilateral triangle; the next tree two rods distant from the first, and two rods from the second and third tree in the first row, thus making each tree two rods distant from its nearest neighbor. By this method 45 trees can be set on an acre—12½ per cent. more than can be set on an acre when placed in a square form two rods apart, and the trees more equally distributed, and sufficiently far apart as not to prevent using the field for other agricultural purposes, such as raising crops of grain, roots, and hay. It is highly important that the land should be under a high state of cultivation; if it is not so, the holes for setting the trees should be dug larger than the extent of the longest lateral roots when spread out so that there may be a space between the ends of the roots and the undug soil, to be filled with rich garden mould, or, for want of that, a portion of well-rotted manure or compost, half a bushel per tree, well mixed with the soil to fill up the hole; but it would not be best to have the manure come in immediate contact with the roots. It is highly important that the trees should have higher cultivation in the orchard than they receive in the nursery, in order to attain a size to bear a crop of apples as soon as may be. To this end, it would be best to keep the field under the plough, and to raise hoed crops for the first few years at least, using a good supply of manures. With such cultivation and a common blessing, it may not be extravagant to estimate the crop of fruit at the end of 16 or 20 years to average eight bushels of fruit per tree, or 360 bushels per acre, and worth, if of the best leading varieties, 25 cents per bushel; making the crop worth $90 per acre, besides a remunerating crop of grain, grass, or roots, on the same, and the field having paid a fair per-centage on its valuation and outlay in crops and fruit up to this time. I know of many orchards that yield a larger revenue than that, where the fruit is of the long-keeping varieties. I planted an orchard fourteen years ago last spring, of very indifferent seedling trees, and on soil not of the best quality for fruit-growing. They received but little attention except being trimmed for the first ten years. The trees of the best and longest-

keeping variety, in the 13th year after they were transplanted, averaged an income of $3 50 per tree. I expect the crop of last year to pay as well. I know of several isolated full-grown apple trees that yield an annual income of from $16 to $20 per tree.

I am of the opinion that we cannot raise cheaper food than apples for the fattening of swine, horses, and cattle—particularly the former. It has been found, by analysis, that the apple contains as much nutritious matter, weight for weight, as the potato; and certain varieties of sweet apples, I think, contain as much per bushel as the potato, if not more. It also saves the expense of cooking, as the potato would be of little value without the cooking. It is idle to think of making pork from potatoes on the score of profit, as long as they are affected by the rot, (with the exception of those too small for table use, and those partially affected with the disease,) as the average price for the last few years has been about 50 cents per bushel, while the pork they would make would probably not bring half that sum.

I would recommend the planting of the following varieties of sweet apples for the purpose of feeding stock, viz: Early Sweet Bough, Golden Sweet, Brown Sweet, Russeting, and Talman Sweeting. They are, all of them, great bearers, and all come into bearing early—the Bough commencing to ripen in July, and is succeeded by the others in rotation, affording a supply of food for nine or ten months of the year. It is highly probable that the same acre of land could not be made to produce so much food of any other description as the before-mentioned apples, while the same ground can be cultivated to corn, or other grain, potatoes or other roots, if desired. Besides the fattening of swine, they are good to feed to store hogs, excellent to recruit horses, and when fed in regular and not too large quantities to milch cows, it increases their quantity of milk. It is often the pride and boast of the farmer that he belongs to the most independent class in society; that he can raise almost all that he wants to eat, drink, or wear; that he is not as dependent on others as others are upon him; which is probably true, to a very considerable extent. Hence we see farmers generally pursuing a diversified business—something at the dairy business, something at wheat and other grain-growing, fruit-growing, &c.; whether their particular farms, locality, or climate are adapted to the particular business or not, or whether it is a remunerating crop. It may be a question of political economy whether that sort of independence, or system, had better be pursued. For instance, suppose wheat, with us, is a crop that does not pay the expense of growing, while fruit is a sure and remunerating article of production; would it not be better to supply a more favorable wheat producing region of the West, and not well adapted to fruit-growing, with our fruit, and receive their wheat in exchange? Each look to the other for a market for its surplus articles, while the facilities for a quick and cheap transit are constantly increasing, by the improvement of natural water-courses and the multiplication of railroads.

Respectfully, yours,

A. H. BARTON.

To the COMMISSIONER OF PATENTS.

VICTOR, ONTARIO COUNTY, N. Y.,
December, 1852.

SIR: In answer to the interrogations contained in the Circular that you sent me in August last, I would beg leave to say, that in regard to wheat, guano is not, to my knowledge, used in the production of this crop. If it were accessible, and could be afforded at moderate prices, we should most probably give it a trial. Almost the only manures that we use are red clover, ploughed under, and gypsum. We sow about 8 pounds of clover seed and 1 bushel of plaster to the acre. Now, if we reckon clover seed at $6 a bushel, (which is about an average price) and plaster at $3 a ton, the cost of these manures is not quite $1 per acre, and yet they are, upon most soils, worth twenty loads of barn-yard manure. Plaster alone, at the rate of 1 or 2 bushels per acre, is an excellent manure for wheat. I think that upon my soil it will generally increase the yield from 5 to 10 bushels per acre. The average product per acre is, upon well-prepared summer fallows, at least 25 bushels. They who sow after spring crops, generally get from 5 to 10 bushels of inferior wheat per acre; all over that amount is eaten up by Hessian flies and weevils, though in some rare cases it may do some better. Our time of seeding is from the 20th of August to the 25th of September. Our time of harvesting is generally from the 15th of July to the 1st of August: we are getting in the way of cutting wheat a considerable earlier than formerly. We used to wait until the berry had become quite hard: by that means we lost a great deal by shelling; the bran became thick and discolored, and the straw was almost worthless. We have within a few years adopted the plan of cutting while the berry is yet considerably soft. When wheat is cut in that state, the heads will not break off, nor shell in handling; the bran will be white and thin, and the straw is quite useful for fodder. And when wheat is cut pretty green it will weigh heavier, and sell higher, than when it is allowed to stand until it is dead-ripe. Among the many improvements in farming implements, I would notice the grain-reaper: that implement is truly a useful invention; it comes to our aid when help is the most needed. One man, three horses, and a boy, will easily cut 14 acres in a day. This implement lays the grain in gairls, instead of swaths; it thereby lessens the work of binding (as compared with the cradle) at least one-third. It cuts and gathers grain a great deal cleaner than the cradle: this fact I am sensible of, for I cut this year a part of my grain with the reaper, and a part with the cradle, and easily saw the difference. Another implement—new, at least, with the American farmer—is the grain-drill. The plan of drilling in grain, although new, has already come into general use; it saves the tiresome drudgery of sowing by hand, and it distributes the grain even and covers it all to a uniform depth. In grain that is put in with the drill, there are no thin spots to grow up with weeds, or thick ones to smother or blight; and from the fact that it covers the seed to a uniform depth, it is thought that 5 pecks of seed put in with the drill, is as good as 6 pecks sown broadcast. Summer fallows, to be sown with wheat, are generally ploughed in June, so as to turn under the red clover while it is in bloom; it is then harrowed down and lies until August, when it is worked over two or three times with the two-wheeled cultivator. This plan is new, and thought to be a great deal better than our former plan of cross-ploughing. By this plan we do not bring again to the surface the unrotted clover and

other grasses, that we at the first time of ploughing had turned under. The two-wheeled cultivator is an entire new implement, and it gives good satisfaction; it brings the soil to a fine tilth, and prepares it for the seed with much less team work than the plough. We plough from 7 to 8 inches deep. Upon a wheat fallow it would not do to turn under whatever there may be of good, rich soil, and cover it to any depth with a cold and barren subsoil. Seeds of every kind vegetate a great deal better in a warm surface soil than in a subsoil; and a subsoil, when it is exposed, freezes a great deal the hardest; therefore wheat, to grow well and stand the winter, requires that the richest part of the soil be kept upon the surface. It is often, however, necessary upon soils that are underlaid with a close, impenetrable hard-pan to loosen and mellow up the subsoil. The subsoil plough is calculated so as to follow in the track of the plough and break up the subsoil, without leaving it upon the surface. This new implement is oftentimes of very great utility: it has not, however, as yet come into general use. The most approved rotation with us, is to sow wheat upon the same lands but once in three years. The first year of the rotation, I sow wheat; the second, I sow clover seed in March; in July cut the wheat; and the third year I mow the clover for hay or for seed, or use the land for pasture. This system of rotation gives us in three years, and by once working the land, a first-rate crop of wheat, and a good crop of hay or clover seed. The best remedy for Hessian flies is to keep the soil very rich, and sow a moderate quantity of seed. I have never, as yet, seen a healthy and vigorous growth of wheat that was injured by Hessian flies; but they generally commit their ravages upon that which is sown out of season, or upon poor, half-prepared fallows.

An insect that we call the weevil has within three or four years made its appearance among us: it is a very small, red, egg-like insect; it makes its appearance when the berry is first forming; it finds its way to the berry, and seems to destroy it by perforating it and feeding upon its sap. It seems to be the most destructive to late wheat: we are trying to escape its ravages by early sowing.

The greatest difficulty that many of us have to encounter in growing wheat, is its liability to winter-kill: the severe west winds of winter are apt to drive away the snow and leave the wheat bare, when it freezes to death. The best preventive of this difficulty is to keep your lands very rich; for it is well known that manure will enable it, if well applied, to withstand almost any degree of cold. The average price per bushel, for the last year, has been $1.

Corn.—Guano is not, to my knowledge, used in the production of this crop; the only manures with us are stable and barn-yard manures ploughed under, and plaster or ashes applied as top-dressing.

The average product per acre is about 35 bushels. The cost of production per bushel, exclusive of land rent and manure, is about fifteen cents.

The best system of culture is to select a piece of gravelly or sandy soil, and manure it heavily with well-rotted stable or barn-yard manure. After spreading the manure, plough the ground as early in the season as possible; harrow it fine, and mark it for rows three and a half feet apart; be very careful to make the rows both ways, and make them very straight. Plant six or seven grains to the hill; when your corn is up sufficiently to enable you to follow the rows, put on your plaster or ashes, and go

through it with your corn cultivator, or corn plough; and let a hand follow with a hoe, to uncover such hills as may get covered by the plough. The old plan of making large hills of earth around the corn is not much practised at present. The most material requisites in the production of a good crop of corn, are a good *soil*, generous culture with the plough, and a good *season*.

To prevent birds and squirrels from pulling corn, take some shelled corn and first roll it in grease, then roll it in arsenic, and leave it where they have been at work. When one of these depredators has eaten of the poison he will immediately alarm his whole kindred; and the consequence is, that they at once leave the field.

Oats, Barley, Rye, Peas, and Beans.—

An average crop of	oats is 38	bushels; of seed,	$2\frac{1}{2}$	bushels.
Do.	of barley 21	do.	3	do.
Do.	of rye 15	do.	$1\frac{1}{2}$	do.
Do.	of peas 20	do.	3	do.
Do.	of beans 15	do.	$\frac{1}{2}$	do.

Peas are thought to be the least exhausting crop; but they are not, to my knowledge, cultivated as a renovating crop.

Clover and Grasses.—Upon dry lands, clover is generally sown at the rate of eight or ten pounds per acre. The best fertilizer for clover is gypsum, sown at the rate of two bushels per acre. Clover meadows will generally produce one and a half ton to the acre. Low or damp lands are generally sown with Timothy or red-top, at the rate of eight or nine quarts per acre. The best fertilizers for such grasses are ashes or lime; they should be sown at the rate of four or five bushels per acre. This kind of meadow will generally produce from two to two and a half tons of hay to the acre. In this connexion I would notice a new implement of husbandry—*the grass-mower*. This machine and the grain reaper have been combined in one implement; it can be bought for $125. With this machine a man and two horses will mow in first-rate style twelve or fifteen acres of grass in a day. A few of these grass-mowers have been used in this vicinity, and they have given the very best satisfaction. "Is clover hay injurious to horses?" In answer, I must say that I have no reason to think that clover that is cut at the proper season, and well cured before housing, is at all injurious to any animal; and with a plenty of oats with it, I have known horses to get fat.

Fruit Culture.—The cultivation of fruit is receiving increased attention in this part of the country: this is the effect of an increasing demand for good fruit in our rapidly-growing cities and villages. There is no fear of the markets being overstocked with choice fruit for a long time to come. There are some orchards in our vicinity that have, with extra care, produced fruit to the amount of $50 per acre.

An orchard, in order to produce well, should be set upon a deep, rich soil. The ground in a bearing orchard, in the spring of the year, should be covered with straw, to prevent it getting too dry to sustain the fruit; and it is best not to crop an orchard oftener than once in four or five years. It will pay well, in an orchard of valuable fruit, to plough the land and harrow it fine, and leave it without sowing. In answer to the question, "Do you know any preventive for the blight in pear and apple trees?" I would say, that the disease here known as the blight seems to be the

effect of a very hot sun upon a quick and tender growth of wood, before t has become sufficiently matured to withstand the heat. Such trees as have been stimulated to a rapid growth, either by severe pruning or a too liberal use of manure, are very liable to this complaint.

I have about fifty young pear trees that have commenced bearing, which have heretofore exhibited strong symptoms of this disease. I have checked it by heading them low and thick, and staking them, so as to turn their heads to the south; by this means the bark upon the bodies and large branches has been protected from the rays of the sun, and the trees saved.

In regard to transplanting, budding, &c., I would beg leave to revise my remarks as published in the Patent Office Report for 1850–'51, at page 430.

Transplanting.—Land that is intended for an orchard should be ploughed very deep or subsoiled: it should be ploughed late in the fall, or early the next spring. When your land is entirely ready, get your trees, and set them the same day that they are dug, if you can. Do not buy trees that have been dug some time, and especially such as have been dug over winter, and lain in heaps "by the heel." Trees that have been treated in this way may, indeed, live, but you lose the growth of them for the first year; whereas, by good management, transplanting will scarcely put them back at all. I have often had peach trees that grew four feet the first season. In taking up trees to transplant, great care should be taken. I have seen trees most horribly mangled by pulling and twisting to get them up, when a very little careful digging would have saved them. Apple trees should not be set less than forty feet apart. Holes should be dug of sufficient width and depth to extend the roots to their full capacity. When the trees are placed in the holes, spread out the lower roots and cover them with fine earth; then spread out another layer of roots, and cover them as before; and so continue until the roots are all got under. The practice of thrusting the roots of a tree into a hole, all in a heap, then piling on hard earth, manure, &c., and stamping it down hard, is sometimes successful, but no scientific cultivator would recommend it. The season after trees are set, the ground around them should, every two or three weeks, be stirred with the hoe; and if great drought should prevail, they should be watered. This should be done by making holes around them with a stick, then pouring on a pail of water.

Budding.—Plum and cherry trees should be budded in the latter part of July or the 1st of August. All other trees should be budded in the month of September. They should be budded late enough, so that they may not grow the same season. The plan of operation is to select a shoot of the present season, with good buds, and cut off each leaf within half an inch of the leaf-stalk; then hold the shoot in the left hand and the knife in the right, the lower part of the blade resting on the shoot, about half an inch above the bud, the thumb of the right hand resting on the shoot, at the lower extremity of the bark to be removed with the bud; the knife is then drawn towards you, parallel with the shoot, smooth and level, so that the bark and a small portion of the wood may be taken off. The stock to be budded should be of the previous year's growth. A T should be made in the bark with the knife, and the bark raised with some convenient instrument; the bud is then inserted, and the bark is

brought back and tied down over the bud, letting the leaf-stalk project out of the seam in the bark.

Grafting is performed in the spring. The last of March is the proper time for plums and cherries, and April for all others. The operation is simple, and consists in cutting off the stock at the point where we wish to insert the scion, and splitting the stock, if small, down the centre; and if large, splitting the bark down the sides. The scion is cut at its lower end in the form of a wedge, and inserted in the split in the bark; the inside bark of the scion should fit nicely the bark on the stock. Our men who practise grafting in old orchards are getting into the way of grafting into very large limbs; they very often graft limbs that are four inches in diameter: they saw off such limbs, and set the scions around in the bark, about three inches apart. I have seen some that had been worked in this way, and I am of the opinion that it will be a very great improvement. The advantages are, that you can greatly reduce the height of large trees by cutting the large limbs, and getting the new top down near the body of the tree. Some that were worked in this way some ten years ago, near this place, have done well—their heads are the finest, for old grafted trees, of any that I ever saw. We use for grafting a salve made of one pound of beeswax, six of rosin, melted with one pint of linseed oil. This salve is used to cover the seams made in the operation, so as to render the whole air-tight. The salve should be looked to occasionally, and kept smooth and tight on the seams, for it sometimes gets open and lets in the air, which will destroy the scion.

Grape Culture is, in this vicinity, confined to the raising of a few vines in gardens for family use. I am not aware that there has been any attempt made at making wine. It is generally agreed that native grapes do extremely well here—they produce most abundantly. I have seen four bushels of Isabellas upon a single vine. There are several varieties of native grapes cultivated here; the Catawba and the Isabella are considered the best. Ground that is to be set with grapes should be trenched to the depth of three feet, and the trench should be filled with various kinds of earths and manures; the vines should be set at least eight feet apart. A trellis for each vine should be made; it should be eight feet wide, and the same in height; beyond which limits it should not be allowed to extend. Every vine, upon such a trellis, should be trained so as to have about eight main shoots. All new shoots should be annually cut off, in the month of November.

Forest Culture.—The Commissioner of Patents could not, in my opinion, have suggested a more important inquiry than that of forest culture. Our forest lands are failing rapidly. Fire-wood in this part of the country has, within the last ten years, risen from $1 50 to $2 50 per cord. It is selling in our nearest cities for $4 50 per cord. In our rich grain-growing county we have reserved but a small supply of forest land, and we have been in the habit, for the last thirty years, of using it for pasturage. By this means almost every young shoot has been annually destroyed. In passing over such forests, they appear to be almost destitute of young trees, and swarded over with grass. It is very easy to see that a piece of wood-land will fail for timber entirely, if there is no young timber allowed to grow. Our plan of forest culture may not entirely rob the present generation of fire-wood; but it will be sure to send our posterity to the Lackawanna or to the Rocky mountains for fuel.

There is another bad practice with us in managing our wood-lands; and that is, we cut large trees promiscuously over a wood-lot. In felling, working up, and drawing away a large tree, we must unavoidably destroy a large amount of young timber. I am fully of the opinion that it is better to cut timber on a wood-lot as clean as you can, than to cut in every part of the lot, and so haggle it all over. There might be some advantage in taking out such trees as had begun to decay, if it were not for the liability to destroy the young timber; but the loss of young trees is a greater evil than the loss of a few scattering old ones. If you cut clean as you go, you give the young growth a chance to start all together, and it is not overshadowed by trees of a larger growth. Forest trees make the most rapid growth while they are young; probably before they are forty or fifty years old. I have seen a great number of young groves of forest trees of a second growth; they would, in my opinion, at the age of forty years produce fifty cords of wood. A family would consume of fire-wood about ten cords a year. An acre of fifty cords would last five years, and eight acres would last forty years. Every family should have at least eight acres of good forest land; it should be well fenced against cattle and sheep. Then begin on the back end, and cut all as you go. Time your cutting so as to get over your lot in forty years. An acre of land will produce, if managed right, one and a quarter cord of wood in a year. That sold at $3 a cord would yield but a small profit; but there is every prospect that in time, timber of every kind will sell dearer by far than it now does.

Manures.—For my views in regard to the best plan of saving manures, see Patent Office Report for 1850–'51, at page 431.

Very respectfully, yours,

GERSHOM WIBORN.

To the COMMISSIONER OF PATENTS.

BIG FLAT, N. Y., *November* 6, 1852.

SIR: I received an Agricultural Circular from your department a few days ago. So far as I am able to contribute anything that will be useful, I will cheerfully do it, as I regard the Report of the Commissioner of great importance to the agricultural community.

In the first place, I cultivate an alluvial soil, situated on river flats; consequently my experience will be mostly confined to that.

I regard it as of great importance to the farmer to have a rotation of crops in a regular system. My first crop after clover is corn. I plough up well and thoroughly, with three horses, about 10 inches deep. I then plant my corn in hills about 3 feet apart; use as manure in the hill, plaster and ashes mixed together, and drop the corn on it. Then, after it comes up, plaster alone, once. Then cultivate thoroughly by keeping the weeds down and moving the ground often—keeping it loose and free to absorb the dews, particularly when it is dry. The yield is from 70 to 75 bushels to the acre; and the price in this market is 63 cents per bushel.

The spring following I sow barley or oats on the corn stubble. By proper cultivation, without any manure, the yield is 40 bushels of barley and 60 bushels of oats per acre. The price in this market for oats is 37½ cents; for barley, 62½ cents; and always ready sale.

In the fall I sow with wheat on the stubble; and in the spring following sow with red clover—the large kind on the wheat ground, which I pasture for one year—or two is preferable—before ploughing up again, to pursue the same system as before mentioned. Wheat is worth $1 per bushel.

I keep mostly cows to eat my pasture, except what my teams eat. Average yield of butter per cow, during eight months of the season, is 200 pounds; price this year, from 20 to 25 cents per pound.

Neat Cattle.—I keep none, as I think they are not profitable on lands worth $50 per acre, as long as there is so much cheap land near market which is worth just as much to keep cattle on.

Hay.—Timothy grass is the best in this latitude. My experience does not show that clover is injurious to horses; but, on the contrary, is good for pasture, and, if properly got and cured, also for hay.

Rearing horses and mules is undoubtedly profitable, for it costs no more to rear a horse until he is four years old, than it does a steer; and then he is worth four steers, on an average.

Sheep are not profitable on low, flat lands; but do better on the hills that surround them.

Tobacco.—It is now reduced to certainty that this crop is well adapted to the river flats in this region of country. Any information with regard to the culture, curing, and management of this crop, would be thankfully received by the farmers here.

Roots, potatoes, beets, carrots, and turnips, of all kinds, do well here, and yield a good profit to those who cultivate them.

Manures.—Guano is not used here, as other manures are plenty, and cost less. Lime would be good for the land here, as well as on all alluvial soils, but it costs too much to use it as a manure. Plaster is extensively used on grass of all kinds, in particular. Price here at the mills, $4 50 per ton.

Fruit.—Apples grow well here, and are paying well those who cultivate them. I consider them good food for hogs, if cooked; and would here remark, that all food for hogs, if cooked, is worth 50 per cent. more, from the fact that a hog does not masticate his food very well; consequently, his digestive organs do not extract the nutriment from it; and grain should be ground for all animals—it richly repays for the trouble.

I would here say, that the system I have pursued in regard to rotation of crops has increased the yield of my crops steadily, from year to year, for the last eight years; consequently I can speak with confidence of the method. I take care of all the manure that is naturally made on the farm; but buy none but plaster and ashes.

If anything I have said will be of any use, I shall be happy to think I made the effort; and if not, I shall be satisfied, hoping that others will be actuated by the same spirit, the advancement of the greatest interest of the American people—agriculture.

Yours, respectfully,

JOHN HAGGERTY

To the Commissioner of Patents.

SCOTTSBURG, SPARTA, LIVINGSTON CO., N. Y.,
November 27, 1852.

SIR: Having received your Circular, and feeling an interest in anything that tends to enlighten the cultivators of the soil, I proceed to give you what little information my limited experience may have produced.

Wheat.—The average product of wheat per acre varies with soil and culture, but I think a rough estimate will set the average at from 12 to 20 bushels per acre. Time of sowing, from first to the last day of September—about the middle. I think the best time of harvest from the 20th of July to the 10th of August, according to time of sowing and location of soil. No particular preparation of seed, more than cleaning from foul stuff; quantity per acre, from a bushel and a peck to a bushel and a half. I prefer a bushel and a half to the acre. Farmers usually plough twice, various depths—from four to eight inches. Yield increasing. Price has ranged from 87½ cents to one dollar per bushel. Sow clover and Timothy for meadows—clover for pasture; sow in the spring.

Corn.—So little raised, and product so uncertain, that it is difficult making an estimate. I prefer grinding corn for feeding; and for hogs, scalding the meal.

Oats.—The yield varies from 20 to 50 bushels per acre. Our best wheat lands will not produce oats very bountifully, without being well manured; our swampy grounds, that have been ditched and made dry, bearing much the heaviest oats, though usually the grains are not so heavy and plump as on high ground. Sow from two to three bushels per acre.

Barley requires loose, rich ground, and on such usually pays well; produce, from 20 to 30 bushels per acre; seed, from 2 to 3 bushels.

Rye, scarcely any sown. *Peas*, very few. *Beans*, as a field crop, not usually planted. I have planted in drills, the way I prefer. The yield varies much with ground and season; I consider 12 or 15 bushels the acre a tolerable yield, although more may be grown. Sowing in drills requires from two to four bushels per acre, according to thickness.

Clover and Grasses.—The yield of hay varies, like everything else, according to soil and season, from 1 to 3 tons per acre—average, about 1½ ton per acre. Plaster is used on meadows with decided advantage, about one hundred pounds to the acre; clover and Timothy, about eight pounds clover seed to four of Timothy seed the acre. Hay, when made in barn or stack, is generally worth from $5 to $10—average, about $7.

Dairy.—The average yield of butter per cow depends much upon breed and keep. I consider six pounds per week for six months a good yield, although individual cows, with more than common keep, do much better. Butter has ranged from twelve and a half to twenty cents at our nearest markets.

Neat Cattle.—Young cattle, unless kept mostly on straw, will consume more, at a fair market value, than they will bring at three years old; yet I consider it better economy for farmers to raise stock to consume the produce of their farms, than sell it off, even if the stock does not net them anything. Average value of three-year-old steers

and heifers, about $20. Good dairy cows—that is, the average that farmers keep—sell for about $20 in spring, and $12 to $15 in fall.

Horses.—I consider the growing of horses profitable. I think a colt can be raised, simply considering the amount he will eat after weaned till three years old, for but little more than a steer, and will sell for three times as much.

Sheep and Wool.—I consider wool-growing, where a farmer is prepared for it, decidedly profitable. Good-sized Merino sheep I think, taking all things into account, the most profitable. A pound of good Merino wool can be grown for about the same as our common coarse wool, and is worth nearly twice as much in market. Where a farmer is prepared for raising sheep, and takes care of them, he can raise ninety out of every hundred lambs dropped in his flock. But understand me when I say *prepared;* I mean, he must have plenty of grass and good hay, and good sheds, and must keep up his bucks and take good care of his sheep, and must take care of them himself.

Hogs.—The raising of hogs, any more than will consume the wash of the kitchen and coarse food, with a little grain to finish off, is a losing business at the present price of grain.

Potatoes.—Irish, average yield about one hundred bushels to the acre; but this season, on good land, they have doubled that amount. The best kinds with me are pale reds—some call them Sardinia reds. Potatoes have rotted so for a few years past, that few farmers planted more than a few in the garden, and potatoes sold last spring for $1 per bushel for seed. This season they have not rotted, to speak of, and sell for about 30 cents.

Fruit culture is receiving increased attention, both by setting out trees and grafting old ones. I think it may be made a very profitable crop, decidedly. More worth of first-rate fruit can be grown on an acre than there can be of any kind of grain. I consider good apples worth as much for feeding hogs or cattle as potatoes; and more, if both are in the raw state. (The value of potatoes is materially increased by cooking.) Northern Spy, Swaar, Roxbury Russet, and Newtown Pippin, seem to be considered the best long-keepers in this section. It seems strange, when we consider the many ways that apples can be used profitably, that farmers do not raise more; but apple trees require care and attention to do well, and this a great many do not understand. Many seem to think they require as little care as the trees in the woods; and with such, apple-trees are not very profitable. The many ways they contribute to the comforts of the kitchen, gives them a decided prominence in my estimation.

Thus, sir, I have given you a hasty sketch of my notions on some of your queries; of many of them I am wholly unable to say anything interesting, and therefore have omitted them altogether. I think your inquiries should have extended to soil nearest market, railroad, or water communication, and in this way affording a history of the country, including price of lands, &c. This would give those wishing to change location a good chance for choosing a place to suit.

COLLINS GARDNER.

To the COMMISSIONER OF PATENTS.

CLINTONDALE, ULSTER COUNTY, N. Y.,
December 15, 1852.

SIR: A Circular from you has been received, and I proceed to reply as follows:

Wheat.—This crop in the early settlement of Ulster county was considered the safest and most remunerating of all the grains then raised on the newly cultivated lands. But a continued cultivation, without any regard to rotation, in process of time exhausted some of the elements necessary to its production, and introduced to us an increased number of insects, which, by nature, appear to acquire their life and growth almost solely from the wheat plant. From these discouraging causes, the farmers, after many years of fruitless toil, were compelled in a great measure to abandon the cultivation of this favorite grain, except in isolated cases, and on highly fertilized soil. The cultivation of rye was substituted, and for many years was considered the staple crop of this county.

For the past ten years, the cultivation of wheat has gradually increased, and at present, in its turn, bids fair to supersede rye. Now, the cause of this change may, to some extent, be accounted for by a reproduction of the elements necessary to its growth during the time it was withheld from occupying the soil, and also a corresponding decrease of insects from a lack of food to subsist on during that period. Be that as it may, we farmers of Ulster hail the return of the wheat crop with feelings of gratitude.

I believe the average production of wheat to the acre in this county to be about 20 bushels, and annually increasing. In some instances 40 bushels and over have been produced from the acre, but these instances are rare. The seed is generally sown without preparation, at the rate of from $1\frac{3}{4}$ to $2\frac{1}{2}$ bushels to the acre, from the 1st to the 20th of September, on fallow ground, with twice ploughing, or immediately succeeding a crop of oats; in the latter case, after manuring. This system of rotation in crops varies with us; but most generally a crop of grass is succeeded by Indian corn, followed the next season by oats; the ground is then manured and sown with wheat or rye, and seeded down with grass. The season for harvesting our wheat is from the 10th to the 20th of July. Various trials and experiments have been resorted to in order to remedy the evils of the Hessian fly, but so far without effecting any worthy of consideration. The manures chiefly used for fertilizing our land are barnyard and stable manures. Lime, plaster, ashes, hen and hog manures, and muck, are all applied to lands when obtainable. The subject of renovating our soils after a rotation of exhausting crops is claiming the attention of our farmers more than formerly, and manures and stimulants are sought after and applied to our lands whenever practicable. Guano is not yet brought into general use in this county, except in gardening and horticultural operations. I applied Peruvian guano to a part of my wheat, sown this fall as an experiment, at the rate of 250 pounds to the acre, sown broadcast, and immediately covered; the increased growth and vigorous appearance of the wheat plant where the guano has been applied, over that manured with other fertilizers, augurs very favorably for the guano. Another year I may be enabled to give you the particulars of the experiment in profit and loss. The average price of wheat at our landings along the Hudson river is about \$1 $12\frac{1}{2}$, ranging

from $1 to $1 25, controlled by the demand for wheat-flour in New York.

Corn.—This crop is extensively cultivated in this county, and is considered the most remunerating at present. It seldom fails with us to produce a fair yield, except in seasons when the *larvæ* of a beetle are prevalent in our lands. When these *grubs* prevail to a considerable extent, neither good husbandry nor high manuring can secure us a crop; and perhaps no other county has for the past twenty years suffered more loss from this source than Ulster. This formidable enemy to agriculture appears gradually to be leaving us, in all probability to appear in some other place, and there to renew the same destructive process practised on us. In order to give this *beetle* a slight introduction to whom it may concern, I will give a brief description of its general appearance and habits. The bug or beetle is about three-fourths of an inch in length, of a dark brown color, and may be seen in large numbers flying through the air, in the early part of the evening, about the last of April or first of May. They deposite their eggs generally in the month of June, on grass land, on soil that is light or loamy. The larva is hatched from the egg during the month of August, and feeds upon the roots of vegetables until the ground becomes frozen; it then descends below the frost, and there remains in a state of torpidity until the following spring. As the frost leaves the ground it ascends to the surface, (exhibiting no increase of growth during the winter,) and again resumes its former mode of living, carefully secluded from the rays of the sun; feeding on the roots of almost all kinds of grasses and vegetables. Its movements are slow and sluggish; its color nearly white, with the exception of the head, which is red; it has six legs, three on each side; it is at this age about one inch in length. It continues its destruction of all green vegetable matter with which it may come in contact, until the ground becomes frozen again. This is its most destructive season through its progress of change. As the ground becomes frozen, it again descends below the frost, (in some instances six feet below the surface,) as before; remains torpid until the next spring, when it again appears at the surface, being now about $1\frac{1}{4}$ inch in length. It continues to feed as usual on vegetable substances until about the middle of June, when it ceases to feed, descends deeper in the earth, and becomes torpid until about the middle of August, when a complete change occurs. It opens lengthwise from the head, back near one-half its length, and forthwith appears in the chrysalis state, in which it remains nearly inactive until about the last of September, when it changes into a perfect state or beetle, and still remains in a nearly torpid state until the following spring, when, about the last of April, it ascends to the surface and immediately commences to reproduce its species.

It has thus far baffled the ingenuity of man to prevent its ravages. Whole fields of Timothy have, within a few weeks, been entirely destroyed by this grub; and thousands of acres of corn have been totally lost in this county by its ravages.

The white and yellow flint corn are usually planted by us—most generally on land that has been lying under clover for the two years previous, when manure is applied, and the ground ploughed early in May, generally about 6 inches deep, made level with a harrow, and marked out in squares for planting, about 3 feet each way. We plant usually from the 5th to the 25th of May, and cultivate with the plough, hoe, and

cultivator: (some crops of corn have been successfully produced by planting in rows, but not considered as safe.) We cut and shock our corn from the 10th to the 20th of September; shocks containing from forty to sixty hills. It remains thus secured until the middle of October, when it is gathered and housed; generally yielding from 25 to 50 bushels of corn to the acre, and occasionally from 50 to 100. This crop is more remunerating than all others, from the value of the stalks as food for stock.

I have used guano as a manure for some of my corn the past season, and, probably from my ignorance in applying it, received no benefit. I applied about one teaspoonful (as directed by some of my books on agriculture) to each hill, and covered it immediately with the soil, a gravelly loam. In a few days my corn received a fine rain, and the corn to which the guano was applied then appeared more vigorous than other parts of the lot. The corn at the time of applying the guano was about two feet high. This rain was succeeded by a protracted drought, which continued until the ears had acquired their full size. At this time, my corn experimented on with guano (as, indeed, all my corn manured in the hill) turned a pale color, lost its vigor, and filled out the ears very indifferently. I shall experiment further with this fertilizer next season. I believe the safest way of applying manure for corn, is spreading it broadcast over the land. The nature of the corn-plant is such that it draws the greatest amount of nourishment from the soil quite remote from the hill. In bestowing my attention to the corn-plant, I find the centre, or tap-root ceases to afford nourishment to the plant after six weeks old, when the growth is sustained (as far as vegetable and mineral elements are concerned) from roots extending far away from the hill, and beyond the possibility of assimilating any great amount of the manure placed at, or immediately surrounding, the plant. Hence the sudden transition from a bounteous supply of nutriment afforded by the tap-root, to a meagre supply, by the horizontal roots in the adjacent impoverished soil, affects, materially, the vigor of the plant at a time when it requires the greatest assistance; and the consequence is, a fair growth of stalk and a light yield of corn.

The cost of producing corn with us varies according to the value of the land, and its productiveness agreeably with my farm book. I find my experience in producing a crop of corn, averaging 40 bushels to the acre, was about 40 cents to the bushel, including interest on land, at $50 per acre. The price of corn, at our nearest market, will average about 55 cents per bushel.

In answer to your query respecting the value of manure made from feeding 10 bushels of corn to hogs, as a fertilizer for a corn crop, I have no data on which I can rely. I will, however, make an estimate that will very nearly approximate the truth. A full-grown hog, enclosed in a yard, will be about eighty days in consuming 10 bushels of corn, with no other drink but water. The whole area of the yard should be under cover, and secured from draining. One load of muck should be placed in the yard in such a manner as to receive and absorb all the droppings, liquid and solid; which, in ten days, should be removed in a heap, under cover, and a like quantity placed in the yard. This, at the expiration of the next ten days, should also be removed to the heap. This process continued until 8 loads of muck (which will embrace the time of feeding)

shall have been saturated with droppings of the hog. This compost, properly attended to, will, in a short time, undergo a slight fermentation, when it should be applied to the land and immediately covered. This will manure the one-half of an acre sufficiently to produce 10 bushels more corn than the adjoining half acre, not manured. I am convinced, from experience, that the value of the manure produced from a hog, when properly cared for, will be equivalent to the cost of the food.

Oats.—This crop is cultivated quite extensively in this county, and is considered to be a remunerating one; in our system of rotation, this crop follows corn. It is generally sown as early in the season as the ground will permit, at the rate of from 2 to 3 bushels to the acre; the ordinary yield about 40 bushels, although in some instances from 80 to 90 have been harvested from the acre. It is an exhausting crop; but the early returns it affords us for our labor, and its convenience as a food for almost all kinds of stock, induce our farmers to produce it quite extensively.

Barley.—Very little of this grain is raised in this county; it does not, generally, on our soil, afford so profitable a return as oats; therefore, it is not cultivated.

Peas and Beans.—These are seldom raised in this county beyond family consumption. Peas are considered rather a renovating crop.

Rye.—This grain is adapted to all our soils, and affords a good return for the labor bestowed in producing it. In our rotation of crops it generally follows oats, and is succeeded by seeding with grass. We sow about 1½ bushel to the acre, and the yield varies from 12 to 35, and in some instances more; it probably would average about 16 bushels. The great demand in the New York market for rye-straw the present season (being from $1 to $1 12½ per cwt., pressed,) will induce a greater area of ground to be sown with rye than usual. Rye is generally worth, in our nearest markets, about 62½ cents per bushel; at present it is worth 90 cents. The present high prices paid for rye and straw will make it a more remunerating crop to the farmer than wheat, and consequently will be more generally sown.

Clover and Grasses.—The extraordinary increased demand the present season for hay, will produce a change in the routine of farming in this county. Our location on the banks of the Hudson, and our convenient access to the city of New York, will induce our farmers to turn their attention more to the production of hay than heretofore. Clover has formerly been considered the most valuable grass for seeding, on account of the luxuriance of its growth and the fertilizing properties it contains. It affords an excellent pasture for stock, and is a good renovater of our soils. We generally sow about 12 pounds of seed to the acre. Timothy has also been considered by us a valuable grass, but not so good a fertilizer as clover, and has generally been sown for its value as pasture or hay. We generally sow about 4 quarts of seed to the acre; probably more seed could be applied to advantage. It is a question worthy of some consideration by our farmers, whether the cultivation of hay for market will not ultimately exhaust our soils without an increased application of manure. The best fertilizers we now apply to the production of hay are decomposed stable and barn-yard manure and ashes. Guano nor bone-dust has not been used for this purpose; and plaster, or

gypsum, as a stimulus, is used much less than formerly. From various experiments with plaster for the past fifteen years, I have been induced to abandon its use. Either our soils already contain a sufficient quantity, or some of the elements formerly valuable in the soil have disappeared. I believe the cost of producing hay will not vary much from $6 per ton.

Neat Cattle.—We have bred in this county, to some extent, several varieties of cattle. I am more particularly familiar with the Durhams, Devons, and natives, having bred no others. I believe the Durhams are most valuable for feeding, and will yield more beef in proportion to the feed given them than any other variety that I have fed. Good selections from native stock are probably as valuable for dairy purposes as any of the improved breeds. For working-cattle I think the Devons unsurpassed. The usual price of good dairy cows in the fall is $25, and in the spring about $35. The cost of raising a heifer until three years old would be about $20, and its worth in market would not much exceed that price. Steers are seldom raised in this county; and heifers should come in as milkers at two years old to pay their raising. The high price of veal in the New York market, and the value of our pastures for dairy purposes, render the raising of stock a losing operation.

Dairy.—Cheese is not made in this county to any extent. Our butter is packed in tubs containing from 12 to 25 pounds, and sold weekly in the New York market. The average price for the present season is about 22 cents per pound; and the sour milk is fed to pigs for early market. The average produce of butter per cow is about one hundred pounds; but if properly cared for, will double that quantity.

Hogs.—The most approved breeds of hogs we have are Berkshire and Suffolk, and their crosses—the former for heavy pork for barrelling, the latter to be taken to market at about six months old. The preference of breeds of hogs is generally determined by the locality or proximity to market. With us along the Hudson river, who cannot compete with the West in producing heavy pork, where grain is cheap, there is a preference for a breed of hogs that mature young. Our cheapest method of making pork is by feeding sour milk, apples, roots, bran, &c.; pork made by feeding grain is less profitable.

Sheep and Wool.—Sheep were formerly bred in this county quite extensively; but the value of our land for other agricultural purposes rendered wool growing an unprofitable business. At present but few sheep are kept here, and those principally for the purpose of furnishing the market with mutton and lambs. Very few but the coarser breeds are now kept.

Potatoes.—This crop was formerly considered one of the most profitable produced on our land; but since the *potato disease* has been prevalent, this crop has materially decreased, although a greater area has been planted the present season than for many years preceding, and the tubers are generally sound and healthy. Many varieties are raised by us without any decided preference. I have cultivated sweet potatoes successfully for several years, and have not found them inferior to those raised at the South. For these I use ashes as a manure, placed in the hill.

Fruit Culture.—The cultivation of fruit is receiving decided attention

in this county. Much labor and expense are appropriated in producing the best varieties of fruits, grapes, and berries. These articles are now furnishing no inconsiderable commerce in this county.

Yours truly,

DAVID L. BERNARD.

To the COMMISSIONER OF PATENTS.

BYBERRY, PHILADELPHIA COUNTY,
January 13, 1853.

SIR: Having received one of your Circulars, soliciting agricultural information, I proceed to give some account of the crops and management of farm land in this vicinity.

The farms in this section are generally small, a majority containing less than 100 acres. The land is in a high state of cultivation, and sells for from $90 to $130 per acre.

The rotation of crops which is generally practised is, first, corn; then oats, wheat, and grass, three years.

Corn.—A Timothy sod is ploughed in the spring, five inches deep, rolled and harrowed; the corn dropped about the 1st of May in hills four feet apart each way; four grains in each hill. Some farmers prepare a compost during the winter and spring, of rich earth, manure, lime, and plaster, and place it on the hill at the time of planting. Others spread the manure broadcast upon the surface during the winter. The corn is worked principally with the cultivator and hoe; three stalks being left in each hill. During the latter part of September the corn is cut up at the roots, and placed in shocks of thirty-six hills, where it remains about one month, when it is husked and cribbed, and the fodder tied up in bundles and stacked near the cattle yards, to be fed during the winter. The stalks from an acre of corn, if properly cured, are equal in value to one ton of hay. The gourd-seed variety is generally planted, and the average product is about 50 bushels per acre; worth, this season, 65 cents per bushel.

Oats are sown after corn, as soon in the spring as the weather will permit, three bushels of seed per acre; and yielding an average crop of 50 bushels per acre. Occasionally much larger crops are raised. The price at present in Philadelphia market is 45 cents per bushel. Some farmers sow clover among oats, and put it down with wheat the following season—others plough the oats stubble; cart on the manure; plough second time; roll, harrow, and sow two bushels of seed per acre. In latter years guano has been used to considerable extent. About 400 pounds are generally sown broadcast, and ploughed in with the wheat; this quantity is considered equal in value to fifteen loads of barn-yard manure.

The Mediterranean *wheat* is universally sown, as it has been the least affected by the weevil, and yields, upon good ground, from 20 to 25 bushels per acre. It is worth, at present, $1 15 per bushel. Clover and Timothy seed are both sown with wheat.

The quantity of *hay* raised is from one to two and a half tons per acre. The clover is generally fed to stock, and the Timothy hauled to Philadelphia, where it is, at present, worth $23 per ton.

The *dairy* business is not very extensively carried on, though most

farmers make some butter to sell. A good cow will produce 200 pounds of butter yearly, worth 25 cents per pound. It is generally sold while fresh, in lumps of one pound each. The usual price of a good dairy cow, three years old, is $30.

Very few *sheep* are kept for their wool. The Southdowns are considered the most valuable. There are but few flocks of this kind in the county. A considerable number of common sheep are purchased from droves, and fattened during the fall and winter.

Hogs.—The best breeds are the Berkshire and Chester County. They are not much raised for market; but are usually kept to consume the offal about the farm. They usually weigh at one year old, if well fattened, 300 pounds. Pork is at present worth $8 25 per hundred pounds.

The cultivation of *root crops* appears to be increasing. The rutabaga or Swedish turnip is the most valuable for feeding stock, and, with proper cultivation, from 600 to 800 bushels may be grown upon an acre. Flat turnips are frequently grown amongst corn, producing from 200 to 400 bushels per acre. Beets, carrots, and parsnips are sometimes grown as field crops.

Potatoes are not very extensively cultivated. The early planted appear perfectly sound, while those that were planted late are more or less affected with the rot. The most esteemed variety is the Mercer, which finds the most ready sale in the market; producing, in a favorable season, 200 bushels per acre. The average price the present season has been 65 cents per bushel.

Manure.—As I have mentioned in a former communication, the main source of manure is the barn-yard, where the straw, corn-stalks, and refuse of all kinds, are collected. Some farmers feed cattle during the winter, which helps increase their stock of manure. Compost is often made of swamp-muck, loam, &c., mixed with lime, plaster, and salt. Lime is used in considerable quantities, and is generally applied on wheat stubble, at the rate of 40 bushels per acre. Plaster, or gypsum, is universally sown on clover fields, when the grass is four inches in height, with astonishing effects. It is a valuable agent in absorbing manures in the form of gases, and is used very profusely about manure heaps, cattle-yards, and stables. Guano is coming into use generally, and is used principally for wheat and turnips, and, even at present prices, is considered by many farmers the cheapest manure they can apply.

Respectfully,

JAMES THORNTON, Jr.

To the Commissioner of Patents.

Lower Heidelberg, Berks Co., Penn.,
December 20, 1852.

Sir: In responding to the interrogatories of your Agricultural Circular, handed to me by David L. Wenrich, esq., I submit the following suggestions:

The land of Berks county is generally of a good quality, the greater part being limestone clay, interspersed with tracts of a rich sandy soil;

the northwestern part, however, consists chiefly of undulating ridges of gravel. I might say, with propriety, that it is nearly all susceptible of the highest state of cultivation.

Wheat and corn are the staple products of this section, and are the principal rewards for our labors; and, as a natural consequence, more elaborate efforts are made in contributing to the culture of these two products than any of the minor branches of husbandry. With these preliminaries, I will endeavor to give you a descriptive account of our present mode of culture, leaving to others better informed in agricultural matters a full discussion of the important inquiries you make.

Wheat.—There are many varieties of wheat grown in this section, some of which are designated by local names; but those most generally used are characterized as White-Blue-stem, Red-chaff, Mediterranean, and Blue-stem. The White-Blue-stem is an esteemed variety; it is a white wheat, with a round and plump grain, weighing from 62 to 66 pounds per bushel; it is rich in farinaceous qualities, yielding from 4 to 6 pounds of flour more per 60 pounds than the other varieties. The Red-chaff is a beardless wheat, with a white grain, and is much cultivated; though it is subject to early blight or mildew. The Mediterranean is generally preferred when it is desired to raise a second crop of wheat from the same land, as it requires but a moderately rich soil, and is not subject to the depredations committed by the fly.

Our general system of rotation is—first, corn, upon Timothy or clover sward, well turned, from 6 to 10 inches deep; second, oats, upon corn ground; third, wheat, upon oat stubble, well manured, the oats being very exhausting; fourth, either wheat or rye, with Timothy and clover. The land is prepared for wheat by two ploughings; the first we perform immediately after the oats have been removed, and the land well manured with common stable-manure. Guano has not been used in this county to my knowledge. The second ploughing is performed about the beginning of September, and in such a manner as to present a grooved or serrated appearance; the wheat is then sown broadcast, and the land harrowed, covering the seed from 2 to 3 inches. The patent drill, however, has been used extensively of late. Our average yield is about 18 bushels per acre; this is not exaggerated, as average yields generally are. The quantity of seed used per acre is from 1½ to 2 bushels, nicely cleaned, without any other preparation. The time of harvesting this crop varies from the 4th to the 12th of July, as the season proves favorable to its growth. The average price at Reading, for 1852, is $1. The yield per acre is increasing.

Corn.—The yellow varieties are most generally cultivated, and are better adapted to the wants of our market than the red or purple varieties. The average yield is about 54 bushels per acre; though not unfrequently 80 to 100 bushels have been harvested by our best farmers. Experience shows that the land most prolific of the corn crop is a clover or Timothy sward that has been in grass for two or three successive years, having produced annually from 1½ to 3 tons of hay per acre. This we plough, in the fall, to the depth of eight or ten inches; the latter requires the combined force of four strong horses in stiff clay. Fall ploughing is preferred, as the soil becomes more compact and susceptible of retaining a proper degree of moisture, and thus protects the corn from the

scorching sun of July and August. By fall ploughing, also, ample time is secured for the decomposition of all vegetable matter ploughed under and contained in the soil, which furnishes indispensable nourishment to the healthy growth of young corn. We generally lime the corn ground at the rate of 100 bushels to the acre on limestone land, and about 60 on gravel, thoroughly mixed with the soil. In the spring, as soon as the ground is sufficiently dry, we give it a good dressing with the harrow and cultivator. About the 10th of May, (the usual time of planting,) the land is set off in furrows, leaving about 16 square feet to the hill; we then plant from 3 to 4 grains in each, and work with hoes and the cultivator till it has attained the height of 10 or 14 inches. It is then ploughed and dressed with hoes; after which the work is considered complete, notwithstanding the pulling off of suckers, if any should appear. Some work the crop during its growth only with hoes and the cultivator. Our method of feeding corn to fatting stock is, to have it ground; average price 65 cents.

Rye is principally sown for the utility of the straw, and is not so generally grown as it was some years past. Ordinary yield, 25 bushels; quantity sown, 1½ bushel per acre; price 75 cents.

Oats are grown extensively, and occupy a permanent place in our rotation of crops. This crop was unusually good this year, and the yield is above an average.

Among the varieties used is the Berks county oats, (so called from the circumstance that it was raised from a few grains, by one of our farmers,) which promises to displace most other varieties in the course of a few years; it comes to maturity one week earlier than the other kinds, and weighs from forty-four to forty-six pounds per bushel. A farmer in this vicinity sowed three bushels of this grain last spring, and obtained sixty bushels of cleaned oats; others have been equally successful. Ordinary yield of different varieties, forty bushels per acre; price thirty-five cents.

Peas and beans are not cultivated as a field-crop.

Clover and Grasses.—The quantity of hay cut per acre varies from one and a half to three tons, and a mixture of Timothy and clover is preferred. In laying down meadows, Timothy is commonly selected as the most efficient seed, and the quantity used from six to eight quarts to the acre. The best fertilizer is fine stable-manure, spread over the meadows in the fall.

Dairy Husbandry.—There is considerable attention paid to this branch of industry, though I cannot give any particulars in regard to it. The price of butter is from 12 to 20 cents.

Sheep and Wool.—Wool-growing was formerly a very lucrative business, but it has been nearly abandoned.

Potatoes.—The Irish only cultivated, as a field-crop. The varieties most profitable are the Mercer and Pink-eyed. Average yield about two hundred bushels, on a productive soil. This crop has been very full this year, and will amply compensate the husbandman for his labors. The rot, so destructive to this valuable artic e in our household economy, has not excited much attention this season, though it has made its appearance in a few localities. We know no remedy for this great evil.

Meteorology.—Our thermometrical registers present no interesting

phenomena for the last season; the temperature of the atmosphere was ranging about the degrees common to localities in 40° 30′ north latitude.

Very truly, your obedient servant,

BENJAMIN SAYLOR.

To the COMMISSIONER OF PATENTS.

COLUMBIA COUNTY, PENNSYLVANIA,
December 18, 1852.

SIR: I received one of your Circulars, (agricultural.) I do a little at farming and feeding cattle. More pleasant food for the mind (setting apart that of the body) is produced by agriculture than by any other pursuit allotted to man. I could almost grow fat, dwelling on the bountiful productions of nature, directed by the art of man. I will pass over all your queries, believing that abler pens than mine will give you all the information that you desire, except as to turnips. I have raised from 400 to 500 bushels of fine turnips to the acre, for many years; I have sold as high as $100 worth from an acre, and had turnips left. If there is not ready sale, I feed them in winter with a little corn-meal; the effect I am pleased with. The turnip crop is almost clear gain. I take a sod that I intend for corn next year: after I have taken off my crop of hay, I turn the sod over as smooth as I can, then put a light coat of manure on the ploughed ground; after which, I give it a harrowing two or three times over, then let it rest a week or two, then cultivate it with a stout cultivator, and as often as the grass appears. I give it a harrowing about the 10th or 12th of August; by this time the manure will be well mixed with the surface, and every sign of vegetation will be destroyed. I sow a little over a pint of seed to the acre, mixing three times the quantity of sand with the seed, as I can sow the seed more evenly on the ground in this way; I then begin to harrow for the last time, and *follow the harrow*, sowing the seed. In this way, about half the seed sown falls on the harrowed ground, and the other half is passed over by the harrow next round. In this way about one half of the seed is harrowed under, and half remains on the surface. If the weather prove very dry, a portion of the surface-seed perishes; but by sowing in this manner, with the ground prepared as above described, I have never failed having a large crop of turnips. I do nothing to them until pulling time. Four or five acres prepared in this way will bring from 1,500 to 2,000 bushels of fine turnips, which is nearly clear gain, as it leaves the ground in nice condition for corn in the spring.

Yours, respectfully, J. P.

HEMPHILL, WESTMORELAND CO., PA.,
November 8, 1852.

SIR: No work, in my humble opinion, which issues from the prolific press of the country, is so admirably adapted to the wants of that class of people for whom it is mainly intended, as the agricultural part of the Patent Office Report. Containing, as it does, the opinions and ex-

perience of practical men in every section of the Union, it conveys information upon many topics which are overlooked by others, and which commend themselves to the attention of the American farmer, because they are the results of patient toil endured by his fellows, and cheerfully endured for the benefit of all. They must eventually produce the most beneficial results, wherever they are read and properly understood and appreciated. I have for several years been much instructed by a careful perusal of them; and it affords me much pleasure to respond to the call you make upon me for my mite toward the common fund.

Wheat.—Guano is not used here in the cultivation of this crop.

The soil of our immediate vicinity is rich, and the great abundance of limestone and bituminous coal affords great facilities for keeping up and improving the fertility of our farming lands. The average product per acre may be set down at 25 bushels, though we sometimes obtain 40. Seeding, from about the 10th of September till the middle of October; seed thoroughly cleansed, without any other preparation. Harvest, early in July. We sow 1½ to 2 bushels to the acre. Plough generally but once, from 6 to 10 inches deep. The yield per acre is steadily increasing.

Rotation.—Clover or other sward, turned down in winter or early in spring, for corn. Lime broadcast or upon the hill. Oats next spring. All the manure and composts upon the oat stubbles. Plough but once, if little oats spring up before seeding for wheat.

Timothy is sometimes sown on the wheat in the fall, but succeeds best with us in the spring, mixed with clover.

The latter grass most frequently sown alone. Sometimes the wheat crop is followed with rye, and occasionally a second crop of wheat is taken off before putting down to grass.

The fields intended for mowing are rolled immediately after the harrow. Mow one or two seasons, and pasture one or two more.

The Hessian fly is troublesome occasionally in early-sown wheat; my practice is to pasture down (if the crop is too rank in the fall) with young cattle and sheep, but only when the ground is dry.

The wheat crop of this section was materially injured the past season, by an insect not inaptly called the "milk weevil," from the fact that its depredations are committed upon the growing crop while the grain is in the milky state. The injury has been almost entirely confined to the "white" varieties, the Mediterranean escaping altogether. The grub (frequently four and five to each grain) is of an orange color, about one-eighth of an inch long. My entire crop was destroyed by it, having sown none of the Mediterranean last fall. There seems to be no remedy for it; and we must avoid risks by abandoning, at least for awhile, those kinds which seem to be its special favorites. Wheat is now worth 70 cents per bushel. We sell our surplus wheat to the millers in the vicinity; and the flour manufactured from it is taken to the Philadelphia market on the Central railroad, which passes through the centre of our county.

Mediterranean Wheat.—Much prejudice appears to exist in some sections of the country against this variety of our great staple; indeed, some farmers have condemned it *in toto*. The seed obtained by me several years ago was apparently very little better than rye. But a great change has come over it; attributable, no doubt, to change of climate and in-

proved culture. It is now much fairer, more plump, and *thinner skinned* than it was when I made my first adventure with it. The flour obtained from it now is much whiter, and the bread it makes is of the best quality. Is it not fair to infer that the grain may be still further improved? Latterly I have had it to weigh 68½ pounds to the bushel. What better favored varieties will beat that? Do not the croakers who are too apt to jump at conclusions, know that science and skill, aided by the genial influences of sunshine and temperature, effect great changes in the vegetable as well as in the animal economy? Davy and Liebig, Cuvier and Reaumer, St. Clair and Johnston, and a host of other distinguished writers, may be considered "fools for their pains," if we do not profit by the wisdom which their reséarches teach us.

Corn.—The average product is about 50 bushels to the acre. The furrows are drawn at right-angles with a small plough, three to four feet apart. Plant, during the first week in May, four or five grains to the hill, thinned out to three. When up, pumpkins are planted in alternate hills and rows, then harrowed and frequently ploughed to keep the ground perfectly clean and mellow. Cultivator used occasionally also. It is fed, generally on the cob, to our horses and hogs, and worth 40 cents per bushel.

Oats.—Average yield is from 40 to 50 bushels to the acre; considered an exhausting crop. Sow about 3 bushels to the acre. Worth 30 cents per bushel.

Barley is not cultivated to any extent; it yields well, but the market is very uncertain.

Rye, since the temperance reformation, is very little attended to. Does not do so well as formerly. Worth 50 cents per bushel.

Clover and Other Grasses.—We cut 1½ to 2 tons to the acre. Cure the former in the cock, and find it the very best hay for our stock. If properly managed, I consider it superior fodder for horses. The prejudice against its use for these animals arises entirely, I am persuaded, from improper treatment in the process of curing. If suffered to parch in the sun, as is the common practice, the leaves crumble into powder; this the beast inhales, which produces a cough, and ultimately the heaves. My horses, eleven in number, are fed exclusively upon it, with a small allowance of corn or oats when at work. They are always in good condition, and are able to draw heavy logs to the saw-mill, at which they are generally employed in the fall and through the winter. Upon every ton of hay, as it is housed, I scatter a peck of salt.

Dairy Husbandry.—We make only a few cheese occasionally for family use, and have made no accurate estimate of the yearly produce per cow, either of that or of butter; our cows being generally kept as breeders, and the calves allowed a free run at the udder. I was the first to introduce the improved Durham Shorthorns into this county, and keep no other breed now. After various experiments with the best native stock, and a few individuals of Devon, Hereford, and Alderney blood, I am satisfied that for all purposes, and under most circumstances, the improved Shorthorns are the best. With proper care and good keeping, (which all animals ought to receive,) they make a larger return for the food consumed than any other. We have had no difficulty in making our half-bloods, at four years old, (reared upon grass and hay alone, and fed for a few weeks before slaughtering upon a full allowance of meal,) weigh

from 800 to 1,000 pounds net. Those of purer blood are not altered, but are sold for breeders.

Our butter is sought after, and brings always a little more than the common market price in Greensburg. When below a fair remunerating figure, each roll is enveloped in a cloth and thrown into a barrel of strong brine: there it keeps perfectly sweet, and is suffered to remain until the price is up. Our process for its manufacture does not differ materially from that observed in all well-regulated dairies. Everything about it must be kept clean and sweet.

Horses are profitable when the requisite facilities for their rearing and management exist upon a farm. To begin right, the best brood mares must be obtained; large, well formed, sound, of good disposition, yet spirited. Great care must also be observed in the selection of a stallion: above all things let him, too, be of gentle temper, yet, at the same time, no *slouch*. The mare will be all the better and foal all the easier if she be worked gently all the time, except a run in the pasture for a week or ten days after foaling. The colt should be haltered when three or four weeks old, and kept in the stable while the mare is at work in the fields; she must be taken at intervals to the colt to suckle. At six months the colt should be weaned, being previously supplied with a small allowance of clean oats, twice a day, as soon as it shows a disposition to eat. After that, we give a couple of quarts of buttermilk, or thick milk, with a handful of bran, or shorts, thrown in to form a kind of "slop," three times a day, and a pint of oats with a wisp of good hay. Upon this treatment it thrives astonishingly, and requires nothing else till spring. If milk be scarce in the winter, we give gruel instead; in the spring it is turned out to graze with the other stock, and suffered to run until fall. The second winter feed it in an open shed upon well cured hay, (clover if you have it to spare,) and the following summer put the harness upon it and use it gently at light work, but do not mount it. Be careful that the harness fit, and do not pinch it. Feed now with the work-horses. If it should be restive, plunge, kick, or rear, do not whip it—let it alone. If hitched at the off-wheel of a four-horse farm wagon, it must go along with the team; provided the leader and saddle-horse are steady. In a day or two its shoulders may get a little galled; bathe them with cold spring water. Let it rest a couple of days, and then hitch it again. It sometimes requires a week or two before it will begin to pull; but it will at the end of that time, if you do not try to make it before by applying the lash. The spring that it is three years old it may be broken to the saddle without any trouble. A colt treated in this way will never prove balky, never hurt itself, and may always be depended upon on a pinch.

Mules and oxen are not used on our farms.

Sheep.—Common stock does not pay very well here; my present flock is a mixture of Dishley or Leicester, Southdown, and Cotswold. The Dishley has fine points, is thrifty, but coarse-woolled. The Southdowns were introduced to correct this fault. There being some danger of the other extreme, at the expense of the carcass too, a fine Cotswold buck was procured two years ago. The young part of the flock is now equal to any I have ever seen. Last year the clip averaged six and a half pounds to the fleece. Next year it will, I think, do a good deal better. In the winter we feed in an open shed, upon clover hay alone; in summer, pasture and salt.

Last year all the ewes had twin lambs, of which we lost but *one*. The cost of keeping the flock over winter was a mere trifle, as they had access to a piece of meadow ground where they got at the grass, except for a short time when the snow was too deep. These sheep are profitable every way. This year's clip brought 37½ cents per pound at home.

Hogs.—The English graziers are the kind we prefer. The Berkshires are a good breed, but the color is objectionable. We do not make pork for sale, except to a very limited extent, and keep no account of the cost of rearing or fattening.

Bacon and Hams.—The philosophical apparatus and the tedious manipulations recommended by some purely theoretical writers for *sugar*-curing hams, are their humbug. There is no more necessity for *sugaring* a ham, than there is for sugaring the words to tell the "*modus operandi*," to adapt either to the taste of a man of sense. If it must be sweetened to adapt it to an over-fastidious palate, why not sugar it in the process of cooking?

Our process is simple, cheap, and as good as the best. When the meat is cooled we pack it into open hogsheads, covering each layer with Conemaugh salt, placing the hams always in the bottom of each cask, then the shoulders, and lastly the sides. In about a week or ten days draw off the pickle, which the salt has now formed, boil it to render it pure again and free from blood; skim it carefully, and add to it as much more strong brine or pickle as is necessary to cover the whole. A little saltpetre is sometimes added. If the hogs weigh 200 pounds or less, let it stay four or five weeks, and no longer; then hang it up to dry, and smoke in a house in which there are plenty of chinks, with a fire partially smothered with green oak sawdust. Do not smoke it in wet weather. When thoroughly smoked and dried, prepare a strong decoction of black walnut hulls or bark, and immerse each piece into it, to prevent damage by skippers or bugs. Pack in boxes with *dry* sawdust, and it will keep as long as you wish, if kept in a dry place not too warm.

Fruit.—The cultivation of fruit of all kinds is receiving great and increasing attention. The crop in this region, I should think, could be made a very profitable one to the farmer. The great degree of *refinement* to which the propagation of some varieties has been carried, has probably been a prolific cause in producing the diseased apples, as it unquestionably has in the case of the "indispensable potato;" and we shall very likely be obliged, in a few years more, to resort to the original sour crab in the first case, and the bitter little tuber in the other, if we wish to restore them again to health.

This season the scabby, knotty, distorted appearance of the pippins, the Rambos, and, indeed, of all our fine varieties of apples, has almost totally unfitted them for a respectable display among our desserts. It is generally attributed to the prevalence of late frosts in the spring; but I apprehend that a very different cause, perhaps the one to which I have alluded, will ultimately be found to be the true one.

Downing's plan of cutting off annually, during the whole life of the peach tree, one-half of the previous year's growth, in connexion with manuring and the cultivation of the soil around, will, in most cases, prevent the yellows.

The borer and other worms must be sought after at the roots every

fall, and extirpated, or all our other labor will be in vain. Leached ashes, and cinders from the smithy, are the best manures we have tried.

Pears on quince stocks are less liable to blight than others. The same heading back as for the peach, with root pruning, will, I have reason to believe, prevent this disease, or at least stay its progress.

The liberal application of stimulating manures to young apple trees is literally "killing them with kindness." If the winter set in early, and the frosts be severe, the sap freezes in the trunk near the ground, before its active and exuberant circulation permits the legitimate formation of woody fibre. The next spring the bark peals loose, and the tree dies. I have lost many fine trees in this way.

The holes to receive the young trees should be large enough to admit of the natural spread of the roots. Where the soil is good, no manure ought to be applied for the first two or three years. Mulching only is necessary to make them grow fast enough.

We have most of the fine varieties of domestic and foreign production which are deemed worthy of cultivation; and we have many seedlings which deserve to take the places of some others with very high-sounding names. I have bestowed much attention to this department of rural husbandry, and am amply compensated for the time, labor, and money expended.

Three years ago, I accidentally came across an apple which is entirely without a core. I obtained cuttings from the original tree and had them engrafted by an experienced nurseryman, and have now several young trees. The fruit is quite large, juicy, and tender when fully ripe, a little acid, but, in the winter, delicious eating. They deserve to be extensively cultivated.

Forest Trees.—The common locust, indigenous to many portions of our country, is one of our most valuable trees for many purposes; for posts, in the construction of fences, it is superior to all others. This tree is very easily propagated, and, in favorable situations, grows with great rapidity. To insure a full supply of healthy young trees, procure in the fall the beans, (which almost every tree bears in abundance,) put them in a suitable vessel and pour boiling water over them; let them remain in it twenty-four hours, and then plant where you want them to grow. If you keep the weeds and grass from smothering them, they will grow 6 or 7 feet high the first season.

The chestnut is another valuable forest tree. Plant the nuts as soon as they fall from the tree, in nursery rows; transplant the second or third season. For posts, when from 6 to 10 inches diameter, they are nearly equal to locust. They grow very rapidly.

The white-walnut, or butter-nut, when it can be obtained of sufficient size, bears a very close resemblance to mahogany when used in the manufacture of household furniture; it is susceptible of a very high polish, and is not inferior to mahogany in brilliance of shading and fineness of texture. The tree is easily propagated from the nut.

Buckwheat.—Considerable quantities of this grain are cultivated here, as well for the delicious cakes which are made of the flour, as for the pasturage which the blossoms afford for our bees. The crop is, however, a very uncertain one, sometimes yielding 30, 40, and even 50 bushels to the acre, and often not more than from 5 to 10. I have always succeeded in having a fair average crop by sowing a month earlier (say

about the 1st of June) than is common. By doing this, the plant obtains sufficient size before the hot weather sets in, which frequently destroys the farina or fecundating principle, and it ripens early enough to escape the first frosts in the fall. If the crop is likely to prove abortive, we turn it under with the plough, and sow the ground with wheat. It acts as an excellent fertilizer in this way. This plant is, contrary to vulgar notions, an ameliorator.

With facilities for procuring lumber afforded by a steam saw-mill upon this farm, I have been making a cheap fence, out of rough materials, which I would describe to you, for the benefit of those who need such defences against the roving herd, if I had time to make the necessary drawings to render the description intelligible, and did not fear that I have already occupied more space than you will be willing to afford to this hasty communication. Suffice it for the present to say, that it is so constructed as to be easily repaired, the posts having no mortises, and no nails used about it; it is at the same time strong and neat, and every panel may be used as a set of bars.

I am, with great regard, &c.,

F. J. COPE.

Now that the home market for our surplus products is in a great degree destroyed by a mistaken policy, are the farmers of the country to be left to shift for themselves in all future time?

When the vast wilderness of the West shall be made to "bloom and blossom as the rose," and when "two blades of grass shall be made to grow where but one grew before," who is to consume this immense addition to our productive industry?

Are these things not worthy of the consideration of those we send to represent us at the American capital?

F. J. C.

TURBUTVILLE, NORTHUMBERLAND CO., PA.,
November 8, 1852.

SIR: I have just completed a thorough perusal of the last two Agricultural Reports of the Patent Office, and, feeling a desire to become a scientific farmer, have no hesitation in pronouncing them valuable documents. A portion of the proceeds of the public lands should, doubtless, be annually applied for purposes of this kind; and no sum could be better appropriated than to publish such information. My opinion is, that the lands of the United States might easily be made to average a valuation of one hundred dollars per acre. All that is wanting is an intelligent industry with regard to seasonable culture, and a judicious application of fertilizers, in order to secure ample returns for the toil of the husbandman. Having noted the following incidents, I submit them to your disposal, in hopes of contributing a mite to the fund of agricultural science, to wit:

There is an obvious analogy between the animal and vegetable kingdoms—hence we find the constitutions and habits of animals adapted to the climates in which they originate; and so with plants: where they are

originally found, the soil and climate will be most congenial; although, by proper culture and attention, they may thrive as exotics. From this it appears important for the farmer to make suitable selections of crops for each variety of soil, climate, and locality. Most kinds of grain may be cultivated to advantage, though not equally productive, in every part of the United States. On the western prairies Indian corn grows to the height of sixteen feet; yields more than one hundred bushels per acre, and one and a half bushel of ears will make one bushel of shelled corn. In the more sterile soils of the North and East it seldom grows more than eight feet; does not often yield more than forty bushels per acre, and it requires two bushels of ears to make one bushel of shelled corn; it likewise requires three times the labor and amount of manure that it does in the West. Still, the farmer feels as well compensated in New York and New England as in the West. In the West, where it is so exuberant in growth, the price is often less than twelve and a half cents per bushel, while in the less productive regions it often brings seventy-five, and seldom less than fifty cents. The grain in the North is likewise more solid, contains more farina, and is more nutritious. In the West there is enough corn-fodder burned every spring to feed sufficient cattle during the winter to supply every poor family of the vicinity with a cow. And in the North, where cattle are wintered on wheat, rye, and buckwheat straw, and every vegetable product kept for winter forage, owing to a want of shelter, there are as many cattle perish as would be sufficient to feed the poor and to remove the poor tax. A proper attention to agricultural economy, and a little legal suasion with regard to humane attention to dumb animals, would do more towards benefiting the poor than a row of almshouses from Maine to California.

While there is so much ado made about home manufactures, it is really surprising to find that millions of acres of land are left unoccupied that might prove highly profitable as pasture for sheep. There is not a man in the United States of sufficient bodily strength to cut half a cord of wood per day, who could not amass a fortune in a few years with moderate industry, added to honest and frugal living. Uncultivated land may still be had in each of the Middle and Western States for one dollar and twenty-five cents per acre, or for less, and that, too, on a credit of five years. A healthy man, with or without a family, and no other property than an axe and hoe, might thus get possession of one hundred acres; the first year he might erect a cabin, and clear and sow with wheat ten acres, besides earning sufficient in the vicinity for his subsistence; the second year he would have a crop to dispose of that would be sufficient to enable him to buy a cow, a yoke of oxen, twenty sheep, some hogs, a plough, and a harrow, besides increasing his household furniture and supporting his family; the third year he could clear fifteen acres more, and every subsequent year continue to clear and cultivate, and on third-rate land could keep the increase of his flocks, until, in ten years, his one hundred acres would be cleared and fenced, and he might have ten cows, two yoke of oxen, ten hogs, and two hundred sheep. After which, suppose the profit of each cow to be annually twenty dollars; that of each sheep, including the lambs, to be one dollar and fifty-cents; there would be two hundred dollars for the cows and three hundred dollars for the sheep—making five hundred dollars; the other proceeds would, doubtless, support his family.

The keeping of sheep is especially adapted to poor, hilly lands—high ground being their natural resort, and briars, roots, and boughs their choice food. But sheep should be nightly put in an enclosure; by which means sufficient manure could be collected during a winter to manure several acres and make them productive. And beans, which grow abundantly on poor ground, are a favorite and especially nourishing food for them.

Hemlock boughs should be plentifully supplied to sheep during the winter; and where they cannot be procured, some spirits of turpentine should be sprinkled on their hay twice a week.

Yours, very respectfully,

HENRY MILLER.

To the COMMISSIONER OF PATENTS.

WARREN, WARREN COUNTY, PA.,
December 20, 1852.

SIR: In compliance with the request of the Circular from your office, and thankful for the small favors extended through it to the all-important interests of the agriculturist, I proceed to reply to some of its interrogatories.

Wheat.—Our county cannot rank as a wheat-growing county. The eastern and southern portions, yet partially cleared, will grow fall or winter wheat, and also the valleys of the Conewango, Brokenstraw, and Alleghany; while the northern and western, now more generally inhabited, produce good spring wheat. The average yield I placed higher last year than it will bear—probably fifteen bushels is nearer the average yield than twenty bushels. Winter wheat is sown in the early part of September, and spring wheat as early as possible in the spring. The yield per acre is rather increasing. We have not yet adopted any system generally, but some of our best farmers are beginning to see the importance of it. We sow Timothy and clover-seeds. This crop generally succeeds corn and potatoes. The Hessian fly does not affect the crop; but rust or mildew occasionally affects us seriously.

Guano is not within our reach, owing to our remoteness from the seaboard. Winter wheat brings an average price of one dollar twelve and a half cents, and spring wheat ninety-four cents per bushel, at Warren, where, owing to the great lumber business of our county, it affords one of the best markets in the United States for this, as well as all other kinds of grain; which makes us more a consuming than producing community, and offers a fair opportunity for the settlement of those who will content themselves to cultivate the soil on wild or timbered farm land, varying from five dollars to one dollar per acre.

Corn.—Our valleys produce good crops, and sure and certain returns. The average product per acre is about 40 bushels, and many now get 50 bushels. The price is 75 cents per bushel, which is sold in the ear to the lumbermen, who get it ground in that state, and prefer it so fed to their working cattle. It will cost probably 25 cents to produce a bushel. The best crop of corn I have had has been grown after fall ploughing and manuring, and ploughing down in the spring, planting fully 4 feet

apart each way. I think I gained in the number of ears what I lost in the quantity of hills, as almost each stalk had two ears, and some of them three. This was a larger variety of corn than the common eight-rowed. But the great majority of our farmers plant on sod, either ploughed in the spring or fall. It is pretty difficult to ascertain properly the results from the feeding of ten bushels of corn to hogs; yet I have never doubted the great importance of the economy of manure, which, till lately, has been very much neglected, and does not now get anything like the attention it deserves. But so well am I convinced of its primary importance, that the trouble of experimenting in the matter would never enter my mind. There is no animal that will convert so much coarse straw to a fit manure as the hog, and they should be largely supplied daily.

Oats, Barley, Rye, Peas, and Beans.—The first, oats, yield, on an average, 35 bushels; price, 37½ cents. Barley, little cultivated. Rye, 30 bushels. Peas, not much cultivated; and beans, some 16 bushels—price, $1 25 to $1 50 per bushel. Peas least exhausting.

Clover and Grasses.—One and a half ton to the acre; our best yield two tons; best fertilizer, gypsum. Timothy is the most preferable kind of hay, with a small portion of the larger kind of clover, as it comes nearer the time of maturing the crop. Red clover, well cured, will never prove injurious to any horse or other animal; but this is the fault with it generally.

Dairy husbandry we are particularly and generally better adapted for than any other. Our rich, close, natural pastures, and well-watered lands, furnish us with facilities of the most natural and desirable kind. Average produce of butter to each cow will probably fall short of my last year's statement—150 pounds—and 100, I think, of cheese. The other details I am unable to furnish, but would say that more care in the treatment of cows, especially in winter, is clearly shown, and with their usual good results. Butter has sold as high as 22 cents, and cheese at 8 cents per pound, in Warren, the county seat.

Neat Cattle.—Cost of rearing till three years, nearly all they are worth at that time, if you do not put a proper value on their manure—worth at three years old from $25 to $27; dairy cows in fall, $20; and in spring, from $25 to $30.

Horses.—We have no mules, but would rather incline to think well of them for farm-work. The cost of rearing a colt till three years old would be from $60 to $70. Brood-mares should be more carefully treated than they generally are, and none should be kept but the very best, with a good warm shed, accessible at all times in the winter and fall, and plenty of good water also; dropping a foal each alternate year, and giving them the full chance of suckling through the first winter, then weaning on the beginning of grass. Best way of breaking: make them well accustomed to the bridle-bit, by bitting, and then gentle exercise and care. The further discussion of this subject would take more time and space than this communication will allow.

Sheep and Wool.—Wool is profitable, but coarse-woolled sheep have the decided advantage, as being profitable in wool and carcass, and the finer grades of wool bringing a far less proportion to the coarser grades than they ought to in this section, so far from market for the first grades, and having a home market for coarse grades. This, with the comparatively

less value of their carcasses, renders the finer the less profitable than the coarser, and I have come to this conclusion reluctantly.

Hogs.—I still hold to the Berkshires as the best; the cheapest are those produced from the dairy refuse, finished off with the soft corn.

Roots.—Carrots are on the increase as a field crop, and considered a good vegetable for horses or cows.

Potatoes were good this season—no disease, and assume all their original qualities; the most prolific is the Mercer.

Fruit culture is, I am happy to say, receiving much attention. I was told to-day by one nursery man that he had sold 4,000 apple-trees in our small county of 15,000 inhabitants, and had never been into our county before to try to sell. There are two or more nurseries that send their trees into this county, and pears and other fruits are more generally called for than heretofore.

Last, though by no means the least, *manure*. My plan is to use up all the straw I raise in bedding, in and out doors, and dusting on lime and plaster of Paris, or gypsum—the latter in particular. Plaster is used here to great advantage, and to good effect. I have thought that cheap sheds might be made of slabs from our saw-mills, to cover our manure from sun and rain, and would like to see the results.

Yours, respectfully,

F. FALCONER.

COCHRANVILLE, CHESTER COUNTY, PA.,
December 10, 1852.

Before answering particularly the inquiries of your Circular, I will briefly describe the character and capabilities of the soil in this neighborhood.

The surface of the country is moderately rolling. The ridge dividing the waters of the Susquehannah and Delaware rivers passes through it; and in our immediate vicinity a subordinate ridge diverges, separating the waters of the Elk and Octoraro. The soil varies in its character from a light sandy loam to a rather heavy clay. There is also a large amount of clay slate, the natural quality of which is generally good; the natural character of the sandy loam is also good. The heavier soils are not so desirable, but by skilful management, in favorable seasons, will produce good crops. In comparison with other parts of the county, our soil may be called middling; though its capabilities have not yet been fully developed.

Within my recollection a large amount of the land in this vicinity was old fields, which had been cropped by the first settlers as long as they would produce anything, and then left to lie in commons. At one time sufficient grain was not raised to supply the wants of the inhabitants; but an entire radical change has taken place. Those old worn-out commons and russet-colored pastures have been changed into fertile fields, and have proved mines of wealth to many who undertook their renovation. The principal agent employed in producing this change was lime. Its application often produced magical effects; and the crops of hay and straw thus produced, afforded the means of making considerable

barn-yard manure. This advantage was maintained, and subsequent applications of lime increased the means of making manure; and thus improvement advanced until those old fields, which were purchased for from $5 to $10 per acre, would now command from $40 to $60 per acre.

A corresponding change has taken place in the character of the farm-buildings. The forlorn, dilapidated old log tenements and stables have been torn down and replaced by comfortable and substantial stone and brick dwellings, and large and commodious frame barns.

A like change has taken place in the character of the stock. Instead of the stunted "land-pike" hogs, diminutive sheep, forlorn-looking cows, and frames of horses, that might be seen shivering round the old stables on a cold winter's day, with tears in their eyes, may now be seen stock of a superior character; and the sleek and contented appearance of the animals indicates that they are well fed and well cared for.

The system of rotation mostly practised here is, first, corn; then oats, wheat, and grass. Commencing with the first, we usually plough up old pasture-land for corn—and the stiffer the soil the better prospect of a crop. The ground is ploughed as soon as it becomes dry enough in the spring; often there are thaws during the winter which afford opportunities for ploughing that are mostly improved; and sometimes the ground intended for corn is ploughed in the autumn preceding. The frosts of winter, besides destroying insects in freshly ploughed lands, which injure the crop, are found to ameliorate the condition of our heavy soils, pulverizing them, and causing them to work up mellow.

In preparing the ground for planting, it is first thoroughly harrowed; and if the weather be dry, it is then rolled, when it is intended to drill in the crop, which is getting to be a common practice. In planting with a drill, the rows are made about four feet apart, and the grains of corn dropped either singly, or two or three in a place; and the drill is made to regulate the distance between the grains, or hills, according to the wishes of the planter. Single stalks are allowed to stand a foot or 15 inches apart, and the hills 2½ or 3 feet, with two or three stalks in a hill. When the corn is intended to be planted in hills, by hand, the ground is marked out one way with a light plough, making the rows 4 feet apart, and then crossed, either with the plough or some other contrivance, making the rows from 3 to 4 feet apart, according to the quality of the soil; the corn is then dropped at the crossings of the rows and covered with a hoe, and two or three stalks are suffered to remain in each hill. The corn is cultivated almost altogether with the cultivator, which is passed through it four or five times, so as to keep the ground loose, and completely destroy the grass and weeds.

The advantage of planting corn in rows both ways is, that it may be harrowed and cross-harrowed. When the corn is ripe it is cut off near the ground, and left to stand in shocks of from 36 to 50 hills each, until it is dry, when it is husked and cribbed. The average yield per acre may be set down at 40 bushels, though the best cultivated farms, in favorable seasons, mostly produce more; and over 100 bushels per acre were produced recently on a farm in this neighborhood, then occupied and cultivated by Thomas Lamborn.

The cost of producing Indian corn per bushel may be set down at 28 or 30 cents, when the yield reaches 50 bushels per acre. This includes

the interest of the price of the land, and one-fifth of the value of the lime and manure, (a coat of each being put on at each rotation,) in addition to the price of the labor.

Guano has not been much used for corn here. I tried a little in 1850, by way of experiment; it was ploughed in at the rate of about 300 pounds per acre; and although the corn to which it was applied was perceptibly better than the rest of the field, the gain, I thought, was not sufficient to induce a continuance of the practice.

It is much more advantageous to feed corn ground into meal, than in the whole grain, and I have no doubt it would be much better cooked than raw; but its economy would, in some measure, depend on the abundance of labor the farmer could command, as well as the price of fuel.

Oats are sown on corn-stalk ground as soon in the spring as the ground can be prepared in good order. From two to three bushels of seed are sown upon an acre, and the average product is about 40 bushels. Immediately after they are sown, the ground is rolled. They are considered an exhausting crop; but that it is really so, more than our other crops, I think is doubtful. They will grow on thinner land than other grain; and being sown after so exhausting a crop as corn, it is not wonderful that the ground is not in condition for another crop without manure.

Barley and *rye* are very little sown; *peas* and *beans* never as a field crop.

Wheat.—After the oats are harvested, the barn-yard manure is hauled out and spread so as to cover the ground pretty well all over. I usually put on about twenty two-horse loads per acre. Sometimes the ground is ploughed twice and sometimes but once, to a depth of from six to eight inches. When it is twice ploughed the manure is mostly put on after the first ploughing. Ploughing twice is found to be beneficial to the succeeding crop of grass. From one and a half to two bushels of seed are sown on an acre; and the time of seeding varies from the first of September to the first of October.

The most common method of sowing wheat is with the drill. The time of harvesting varies according to the season and exposure, from the last days of June till the middle of July. We do not prepare the seed in any way previous to sowing, but are careful that it is thoroughly cleaned of all trash; and we find this practice a complete remedy against chess. If perfectly clean wheat be sown for a few years, chess will be completely eradicated; we have no more fear of our wheat turning to chess, than we have of our corn turning to mulleins. The average yield per acre is about 20 bushels, leaving out some seasons when the crop is destroyed by the fly. On a farm adjoining mine, last year, then occupied and owned by George Palmer, the crop of wheat averaged 40 bushels per acre; but such yield is uncommon. The yield per acre is increasing. The variety mostly sown is the Mediterranean, which, as a general rule, succeeds better than any other; it ripens early, and thus mostly escapes rust. When first introduced it was a very dark, inferior wheat; but it has so much improved by cultivation, that it makes as white and as good flour as any other red wheat.

We know of no remedy for the Hessian fly, and are not much troubled

with other insects injurious to wheat. The average price of wheat in 1852, was 90 cents per bushel.

We usually sow Timothy seed in the fall, at the time of sowing the wheat; it is sometimes harrowed once, or sown before the drill, and sometimes it is sown after all is done. Some drills are so constructed as to sow wheat and grass seeds at the same time. In the spring, usually in March, the clover seed is sown.

Guano is getting to be used to some extent in this neighborhood for wheat, but I know of no experiments sufficiently accurate to determine the gain in bushels per 100 pounds; and as its use is increasing, it must be considered remunerating. I have used it to some extent, mostly to finish out fields that I could not cover with barn-yard manure, and the yield usually has been as good where the guano was, as where the best manure was put.

The system of rotation which I have described, I think is the best here; for although it is sometimes deviated from, I know of no experiments in that way sufficiently successful to warrant a long continuance therein.

Some, instead of sowing wheat on oat stubble, have sown clover seed with the oats, and the next year ploughed up the clover sod for wheat. This method will almost always produce better wheat than by sowing it on oat stubble; yet it is more difficult to get the grass to take well, which here is an important matter. From one to two tons of hay are usually cut per acre. In this neighborhood no kind of fertilizers are often used on grass lands except lime. The grass land is mown two or three years, pastured one or two more, and then ploughed up for corn. Occasionally barn-yard manure is spread on grass land where it is intended to lie longer in grass. Clover and Timothy are the kinds of grass seeds mostly sown, and at the rate of from five to six quarts of each per acre. Timothy is considered an exhausting crop, and in other ways is objectionable; but it turns off a large amount of hay. I wish we had a substitute that would mow well and make good pasture. One of my neighbors has introduced rye-grass, which I think will make good pasture; but it is doubtful whether it will turn off a large amount of hay.

Pasture, however, is a great object, as most of our farmers grass-feed cattle for market, and find it one of the most profitable branches of their business.

Red clover hay is injurious to horses that have not sound wind, and some think that very dusty clover hay will produce heaves. But if clover hay is properly cured and "got in" without rain, it will keep horses in better condition than any other.

Root crops are not much cultivated in this neighborhood. I planted a patch of the ruta-baga this year by way of experiment; the size of the patch was something less than half an acre, on which I applied 125 pounds of guano in the rows, and the produce was 260 bushels. The ground was first ploughed and harrowed, then furrowed out nearly three feet from row to row, then the guano was sprinkled along the furrow, and the dirt thrown into it from each side with the plough, when the seed was planted on the top of the ridge thus formed.

N. LINTON.

LUZERNE, WYOMING VALLEY,
October 29, 1852.

SIR: Your Circular came to hand about the 1st of September last, and I cheerfully comply with your request, as far as my ability renders me competent to the task. Luzerne county is naturally divided into three divisions or qualities of soils: the first quality, being along the Susquehannah and other large streams, being very fertile and productive; the second quality being upland plains, remunerating to the careful cultivator; the last division being hilly and new, though naturally productive.

Wheat.—Average yield, taking the two first named divisions, is about 20 bushels per acre; last named, 10 bushels; all on the increase. We use no guano, or very little, in the valley; we depend mainly upon the barn-yard manure, together with clover, which is our main fertilizer, though lime is coming into use on clay soils, and with very good results. We generally plough twice for this crop, taking care to do it well both times. We sow one bushel and a half per acre. We are beginning to use the drill, with the first usually, as it prevents winter-killing, and is a saving of seed, putting the wheat all in an equal depth. The yield of wheat is increasing per acre. Our rotation of crops varies according to the state of the soil; commonly taking off three crops before seeding to grass. I cannot be particular here at this point, as we cultivate wheat, corn, oats, potatoes, &c., alternately, observing the three field system with the above named crop. Average price of wheat $1 at home. As we have a home market, our prices of all kinds of crops average about as high as the city of New York the year round. Best variety, White-Blue-stem. We sow Timothy and clover after wheat; generally sown in the spring, about six quarts of seed per acre. Not troubled with Hessian flies or weevils.

Corn.—We usually plough sward land for this crop. Average yield about 50 bushels, in the valley, per acre; very little grown on the back ands. We plough deep in the spring; harrow thoroughly; mark the land three and a half feet each way; use a marker instead of the plough, making three marks at a time, with two horses attached, as to a sled. We plant from the 5th to the 20th of May. Harrow, plough, cultivate, and hoe, according to our fancy, taking good care to keep it clean, and have it done by the 4th of July. We usually plough twice or thrice, harrow once or twice, cultivate about once, and cross up each line with the hoe. We always drop plaster on corn at the time of planting.

The best method of feeding is, I think, to have your corn for horses and cattle crushed; for milch cows and working oxen it is better than the clear meal. If the crushed meal is mixed with chaff of any kind, it is a cheap and very nutritious food. Average price of corn is about 62½ cents for fifty-six pound corn. All sold at home, as we live in a mining district.

Oats sown after corn. Average yield in the county about 40 bushels per acre. Very little rye sown; yield about 15 bushels. Barley, none sown. Beans are coming into culture. Oats are said to be exhausting to the soil. Rye is not an exhausting crop; and, with good management, I do not think that oats are. Peas are not cultivated as a renovater. We usually sow two bushels of oats per acre; one bushel of rye. Beans we plant in the drill, about four inches apart in the row, and

cultivate with the plough and cultivator. Oats worth 40 cents; rye, 75 cents; beans, $1 25.

Clover and Timothy.—Average yield this year is not above one ton and a quarter, owing to an early drought. The average yield for the valley in good years is about two tons per acre; the back lands about one ton and a half. The back lands are on the increase, many acres yielding two tons per acre when they have been properly cleaned of stones and stumps. Lime is the best fertilizer for meadows; apply from 50 to 100 bushels as a top-dressing in the fall, and it will work wonders. For meadows and pastures we usually mix Timothy and clover, about equal. Red clover is not injurious to horses. Timothy hay is worth from $9 to $10 per ton in Wilkesbarre; though this year it is worth $12 up to this time.

Dairying.—There is not much done at this branch of business in the valley; but on the back lands it is on the increase. I have conversed with dairymen recently; they estimate the average yield of butter per cow at about five pounds per week during the milking season, from spring till fall. Average price of butter, 18 cents; it is now worth 22 in Wilkesbarre. Dairying is good business if properly attended to.

Neat Cattle.—Very few are permitted to arrive to the age of three years—only those which are preserved for cows. Our cows are fine grades; the Durhams are not sought after much, owing to their tenderness. A good cow will command in the spring from $25 to $30, and not much less in the fall. The Devon blood appears to be the favorite stock. Our beef is mostly made on grass; very few stall-fed cattle, except some old oxen, which are fatted after the fall work. The average price of beef is about $7 per hundred; choice cut is often up to $12 50. The Durhams will pay best in beef, but are not so good as milkers.

Horses and Mules.—Very few horses raised. The growing of horses is profitable; a good young horse at a proper age will command from $100 to $150, and even more; and by judicious management a colt will pay his keeping after three years old, and improve on it. The expense of raising a colt is not more than that of raising a steer. Colts should never have a handful of grain until near three years old, and then fed sparingly and worked lightly until they mature for service. I usually raise one or two colts every year. I work my mares lightly up to the time of foaling; I then turn them off to grass and let them run a few weeks. Put the mares to work again, taking care not to heat their blood. Shut the colt from the mare half a day at a time, which will prevent accident. Brood-mares should never be fed heavy; in fact no horse ought to consume over 15 quarts a day of oats, even at hard work. My rule is, if a horse will not keep in fine condition on 12 quarts a day, I will let some one have him that will feed him more. My mode of breaking a colt is this: commence handling early after weaning; put him up the winter after he is two years old and commence using him, and by spring he will be able to do light work, being broken during the winter season almost imperceptibly. Colts should always be provided with the best accommodations as to shelter, litter, &c., and fed on hay during the winter; allowed to run in the yard or stock-field during the day; provide early pasturage.

Sheep and Wool.—Both are profitable: very few sheep raised. Mutton is in great demand; worth as much as beef, or more.

Hogs.—Men differ as to the breeds. The red hog from the State of New York is quite a favorite with some; others prefer the Chester county white hog; and from what I have seen of both, I think a cross would produce the best breed. I have now some of the finest pigs I ever had of this cross, though the red blood is far from pure.

My experience in fatting pork is this: if your hog is worth $10 when put up, it will take nearly $10 worth of corn to make him worth $20, so there is not much gain; though if your hog-pen is liberally supplied with straw, they will make a liberal supply of fine manure. Pork is worth at the butcher's stall 10 cents—about 8 cents from the farmer; it is rarely less than $5 50 to $6 in the pork season. Farmers raise very little more than they want for their family consumption.

The best mode of putting up pork is this: cut up your hog; take out the chine; salt the hams and shoulders in a clean cask with rock salt; let it remain about 48 hours, then pour on cold water enough to cover the hams; put on a weight, and let it remain about four or five weeks, then smoke with maple or hickory. Manage your pickle pork much in the same way, taking care in both instances to remove the bloody pieces. My mode for pork is this: I cut my middling in convenient pieces for handling; pack down close with rock salt, packing in the hocks and side-meat together, excluding everything else; make a brine strong enough to bear an egg; pour it on after it has been packed about twelve hours; add saltpetre, about four ounces to 1,000 pounds, or thereabouts; put on your weight, keep it under the brine, and all will be right.

Potatoes are a fine crop this year. Average yield about 125 bushels per acre, fine sized, clear of disease, and worth 37½ cents from the field. After sorting, refuse worth for pork 25 cents a bushel; cooked potatoes worth nearly half as much as a bushel of raw corn in the ear. We plant about three feet apart; work much as we do corn. Most prolific variety is the Peach-blossom, introduced a year or two ago. Every man has his hobby in potatoes as well as in many other things; each one preferring some peculiar kind.

Fruit Culture is rapidly improving. Apples are a profitable crop for the farmer. The refuse apples are fine food for hogs up to the time they are ripe enough for other purposes. Sweet apples for hogs are supposed to be as good as cooked potatoes. I have observed some of my neighbors' hogs in high condition on apples alone.

Manure.—Farmers in general are too careless in this matter. My mode of preserving manure from waste is to scatter gypsum liberally on the barn-yard during fermentation; haul out as soon as fit, and apply to my crops.

Root Crops do well, but, owing to the scarcity of laboring hands, very little is done in this branch of business.

Cotton, Cane, Rice, Tobacco, and Hemp.—None raised.

M. F. MYERS.

QUAKER BOTTOM, LAWRENCE COUNTY, OHIO.

SIR: Your Circular was duly received, and I proceed to answer some of its inquiries.

Wheat.—Guano is not used in the production of farm crops in this

county. Average product per acre, 15 bushels; time of seeding, October; May wheat has been cut on last day of May; middle of June, usual time of harvest; seed seldom brined and limed, though considered beneficial; 1¼ bushel seed to the acre; used to plough three inches deep: product, 8 to 12 bushels; we now plough from 6 to 8 inches: product from 12 to 20 bushels—occasionally, 30 to 40.

Rotation of Crops.—Among old-school or anti-book farmers: corn, corn, corn, forty years in succession, and then move to the Far West. Among the progressives: clover, two years; potatoes, corn, wheat, clover. Rich land, well pulverized, best preventive for Hessian fly; thrash soon after harvest, to avoid the weevil. Average price of wheat this fall, 65 cents. We sow clover on our wheat in February.

Corn.—Average product per acre, 40 bushels; cost of production, 12½ cents per bushel.

Culture.—Break the ground deep, as early as dry enough; harrow well; roll, if cloddy; furrow 4 feet wide each way; leave three stalks in the hill; go through with cultivator as soon as the rows are perceptible; the opposite way with same six or eight days after; next, with a long bull-tongue, as deep as possible; next, the shovel-plough; finish by passing again each way with cultivator.

Best method of feeding corn to cattle and horses, corn and cob crushed together; for hogs, ground and cooked, or fermented into thin slop.

Oats.—But few raised by our best farmers; considered unprofitable and exhausting; average product, 25 bushels.

Clover and Grasses.—Average cut, 1½ ton per acre. Best fertilizer on dry sandy lands, ashes and gypsum; on damp clay soils, barn-yard manure and lime. Pastures should never be grazed short, and meadows not at all, unless frequently manured. Clover and Timothy mixed, is preferable for laying down both meadows and pastures on dry land; red-top on wet; two quarts of each to an acre.

I have witnessed no injury to horses from eating first crop of clover; second crop frequently causes saliva.

Hogs.—Best breeds, Bedford, China, Byfield, Russia, and Sussex, all have their admirers. The cheapest method of making pork is to give the pig the run of clover and stubble fields, and of the fruit orchard that abounds in the very best sweet apples, peaches, &c., until he has nearly attained his growth; then put him up in a close pen and feed on corn-meal. If cooked or fermented, all the better. Pork for bacon should be well rubbed all over with salt, and packed in bulk; coarse salt is best; a small portion of saltpetre should be added. After lying two weeks, it should be overhauled, again rubbed with salt, and repacked. At the expiration of five weeks after first packing, provided the pork is not large, wash clean, hang up, and before the surface is quite dry, completely saturate the whole volume of air in the smoke-house with quicklime. This may be done by violently stirring or throwing very fine dry lime in the smoke house. This will effectually prevent injury from skippers, bugs, &c. Smoke well with sound hickory wood. Let your bacon hang as long as you please.

The *Irish potato* is a staple crop on our river-bottoms, in this county; large quantities are shipped to New Orleans, and find ready sale, at fair prices. Our best market, however, is at the iron-works, in this county, for much the greater portion of our farm products. Average yield, 100 bushels; cost of production, 10 cents a bushel. Best varieties for table

use, Meshannock and Pink-eye; most profitable for Southern market, Flowers of Edinburg, Orange potato, and Baltimore Blue. The most productive of all is the red Meshannock. Over 570 bushels to the acre have been produced, the past season, in this (Quaker) Bottom, and over 544 last year on the same ground; and that, too, without manure. The land had been under a grass lay for nine preceding years. These extraordinary results have, as yet, only occurred with members of well-organized farmers' clubs. Four competitors this year (members of the Rome and Union Farmers' Club) produced as follows: 300, 320, 416, and 572 bushels to the acre.

Situated as we are, on the very southern verge of the State, the potato seldom suffers from the prevalent disease, except when planted on wet land, or when shaded by weeds, or otherwise. We are about as far south as where the potato will succeed well, and is much less subject to the rot than in cooler climates. The sweet potato also succeeds well here, when rightly managed. It requires a warm, rich soil, and early forcing. Grounds upon which large quantities of straw or chaff have been nearly decomposed are good, and have produced with us over 300 bushels per acre, of the common yellow variety.

Fruits.—Apples, comprising some 400 of the best varieties extant, are cultivated here for home consumption and for export. There is no crop that pays so well as our best sorts of apples. An orchard of Rome Beauties, ten years old and upwards, well cared for, will average an annual profit of $200 per acre. One of my neighbors, this fall, gathered and sold 11 barrels from a tree which is thirteen years old—worth $1 25 per barrel, equal to $500 per acre. Apples, and especially our best sweet sorts, are very cheap food for every description of farm-stock and poultry. The Rome Beauty stands pre-eminently ahead of everything yet fairly tested, for profit or exportation, and combines more desirable qualities, everything considered. The Roxbury Russet, Newtown Pippin, Bellflower, and Rawle's Genitor, are valuable for export.

The *Peach* succeeds well here, and very many of the finest sorts in the world are cultivated in our orchards and nurseries. We feel quite confident that no portion of the country can excel us in the production of fine apples and peaches.

Grafting or *budding* should be performed some two feet or more above ground, as the seedling stocks are generally much more hardy than our finer sorts, and as severe heat or cold usually affects the trunk of the tree, just above the surface of the ground. Hundreds of root grafted trees were killed last winter, in this vicinity, by severe freezing; while seedlings, and grafted and budded trees, that were worked high, almost universally escaped uninjured; other chances equal in all respects.

H. N. GILLET.

VERMILION, ERIE COUNTY, OHIO,
December, 1852.

SIR: Your Circular was duly received, and I am thankful for an opportunity of contributing my mite towards the mass of information annually disseminated from your office. I esteem the Agricultural Reports

very highly; and it is more from a desire to possess them, than from any expectation of contributing anything essential to their completeness, that I now write. I shall not attempt to answer your inquiries in detail. The readers of former Reports have been made acquainted with the peculiarities of our location, and the methods of farming here. Although there is a preceptible improvement made from year to year in nearly all departments of agriculture, still it is difficult to point out the particular items of which it consists.

Our crops of *wheat* have been large for three consecutive years, partly owing to the seasons and partly to improved tillage, more thorough drainage, and hardier varieties of wheat. The Soule and White-Blue-stem have nearly driven the Illinois, Mediterranean, Red-chaff, Bald, &c., out of cultivation. The Blue-stem is said this year to have outdone all other varieties from 5 to 10 bushels per acre. It is an excellent wheat for flouring also, bearing the highest price. Our lands generally do better back-furrowed into about eight-paced lands than to be left level; and if the ploughing is performed so as to give the proper declination to the dead furrows, and passages cut for the water to pass off freely, there is much less danger from winter-killing as well as from drowning. Very deep ploughing and subsoiling have not been practised to much extent; though when done, the results, I believe, have been satisfactory.

Corn, the next crop in importance to wheat, has proved a short crop this year, owing to excessive wet all through the proper time of preparing the ground and planting. Very little was planted till June; much seed rotted, and replanting continued till July; then haying and harvesting prevented suitable after-cultivation; and although the favorable fall ripened nearly all that set for ears, still there is a great falling off from former crops.

There is at present a tendency to seeding down lands to grass. The low price of wheat, and the increased demand for beef, mutton, wool, and swine, are fast decreasing the quantity of land in wheat; and as "one extreme follows another," it is to be expected that wheat and corn may soon bear a high price in proportion to other farm products. The advocates for an equilibrium of prices are probably doomed to everlasting disappointment, or at least as long as men are free to cultivate the crops they think the most profitable, and he appears to be the most successful in money making who shapes his business so as to be a little ahead of his neighbors in meeting the vacillations in the markets. Some may sneer at the idea of money-making being regarded as a part of good farming; but with all due deference I submit if that is not, in our country at least, the main point in farming, mechanics, and the sciences—in church and State? It is this consideration which induces us to prefer purchasing more lands to graze our flocks and herds upon at $10 or $20 per acre, rather than double the produce of the old homestead by under-draining, subsoiling, and manuring, at an expense of from $30 to $50 per acre. These outlays for improvements so highly recommended, and no doubt very beneficial, will of necessity be delayed in any country, till population becomes dense and lands high-priced.

In looking over your former Reports, I have been amused as well as instructed. Some will figure up wonderful profits on sheep husbandry; others on this or that crop. One, I recollect, apparently a very intelligent gentleman of Illinois, says he can "raise a pound of fine wool as

cheap as any man can raise a pound of pork." His location must be a sort of sheep paradise; and, since Illinois is famous for corn and pork, it would seem that a man might get rich very quick at wool raising there, at the present prices. I am no great farmer: what little bringing up I had in that line was in the woods, and among the stumps, where scratching the ground was about all we could do, and about all that was necessary, to insure enough to eat and drink; and as to the surplus, it was little matter whether we had any or not, where nobody wanted to buy. We made no great profits then; and although I have since tried almost every kind of crop suitable to our country, and have been about as successful as my neighbors, and my neighbors about as successful as "*the rest of mankind;*" still, I have never found any kind of farming that would much more than pay expenses, if the work was all hired and paid for. It is as true now as in "Poor Richard's" time, that—

"He that by the plough would thrive,
Must either hold himself or drive."

We cannot reasonably expect more than a moderate per cent. profit, one year with another, in any branch or all the branches of agriculture; and I believe, in nine cases out of ten, those do best who pursue the even tenor of their way, taking care to have a "little of all sorts," so that if one or two kinds fail, there will be others to fall back on—slacking up on those branches which are overdone, and "letting out a link" on those which promise better—carefully adopting new improvements, and experimenting, on a small scale, with a view to new discoveries. Raising extravagant expectations, by overdrawn estimates, sends many people from one branch of industry to another, in a sort of jack o'-lantern chase after wealth, through the bogs and quagmires of disappointment and poverty. Those of my acquaintances who have for a series of years patiently pursued their course—carefully doing *well* whatever they have undertaken, and practising frugality and *sobriety* withal—have attained to competence; while those who have been chasing one scheme after another that held out the promise of sudden wealth, have "*come up,*" like the Dutchman's hogs, "among the missing."

Fruit Culture (especially apples) is growing more and more into favor. From expriments made this fall, and previously, we think apple orchards are very profitable for making pork, and a good sour apple is much better for that purpose than a poor sweet one. Hogs permitted to run at large in an orchard from the time the apples begin to fall till winter, with a little corn to finish on, make excellent pork, and at small expense, when compared with corn-made. They are good also for other stock, especially young colts; and so well do our people now understand this matter, that this season scarcely more cider has been made than will suffice for vinegar—apples being mostly used for feeding.

I threatened the New Jersey peach-growers with competition from our lake region, in a few years, in my former communication. I beg leave to withdraw the promise till further advised. The most popular varieties of peaches have not stood our climate very well for two seasons past, and the *curculio*, also, appears to have an excellent taste for them—discriminating very nicely between a late sour peach and a fine flavored "Honest John." We know of no remedy for this pest. The peach worm may be kept under in various ways. Digging them out about 1st of May, 1st of July, and again in November, I find the surest and about

as little expensive as any way. The extreme cold of last winter destroyed some trees, and utterly ruined the fruit-buds. This is the second time, in thirty-five years, that the cold has been so severe. The thermometer indicated, in December, from 10° to 12° below zero, which killed nearly all the fruit-buds of the largest and best varieties of peaches; and in January the mercury went down to 18° and 20° below zero, which, I believe, was about the climax of cold weather ever known here, and destroyed even the hardiest kinds, which had stood the former cold unharmed.

For the benefit of orchardists, I will relate my experience with the fire-blight on apple and quince trees: About fifteen years ago it made its appearance in this vicinity. It attacked a corner tree in my orchard, and gradually spread from branch to branch, till, in six or seven years, the whole tree was nearly dead. It spread to the adjoining trees, till it had overspread an acre or two, more or less. Having learned that cutting off the infected branches and burning them was the only reliable way of getting rid of it, I commenced doing so, although it seemed a great task. I cut down the corner tree, and lopped off most of the tops of others, and followed the scourge close for two or three years, cutting off every little twig I could find infected, and committing them to the flames, twice or thrice during each season. The result has been most satisfactory; and for two years past I have not seen a blighted limb in my orchard. The labor was much less than I expected, also; and I would urge it upon all to apply the knife and fire to their blighted trees, for their own and neighbors' sakes. I conclude, from the manner of its progress, that the insect which causes the blight does not itinerate far in one season, and may be successfully combatted as above described. The curculios, on the contrary, seem to circulate extensively; they have wings, and know how to use them, as any person may satisfy himself, if he will place one in an uncomfortably-warm place for a short time, though they are not over-fond of displaying their aerial capabilities on common occasions.

The displays of stock, crops, manufactures, improved implements of tillage, &c., at our State and county fairs, which are becoming quite common in Ohio, are doing very much to foster a spirit of improvement. Very many attend, and, by contact with others and their improvements, a spirit of generous competition is promoted; the rust of home born ideas is rubbed off; new acquaintances and new attachments are formed; the scholar learns from the clown, the clown from the scholar, and all are mutually benefited. It would hardly be supposed that any who are able, and like to enjoy the pleasures and profits of such exhibitions, would be so parsimonious as to refuse to contribute their mite towards their expenses. Experience shows, however, the contrary; and many are content to let their neighbors bear the expense, while they reap equal benefits with them. This parsimoniousness has compelled the managers to fence the grounds, and demand an entrance-fee to meet expenses, which, to some extent, excludes the poor. If all who are abundantly able would contribute their dollar a year, (and how could they expend a dollar to better advantage?) there would be ample funds; the fencing might be dispensed with, and the high and low, rich and poor, enjoy their benefits equally. But we read of a time, "There were giants in those days." I suppose there were *little men*, too, as there are in these days. However, we may charitably conclude it is more from want of reflection on the

subject, than from intrinsic littleness, that so many stand aloof from bearing their share in the burdens incident to this means of improvement.

Yours, respectfully,

BENJ. SUMMERS.

BUCYRUS, CRAWFORD COUNTY, OHIO,
December 29, 1852.

SIR: In answer to your Circular, received some time since, I will submit the following: In the culture of *wheat* there is no manure except barn-yard used in this vicinity, and that, if fresh and applied directly to the wheat, is as often an injury as a benefit; the preferable mode is to apply it to a previous crop. A good sod of clover, Timothy, or blue grass, turned the middle of August, harrowed until well pulverized, sown about the 10th of September, with $1\frac{1}{4}$ bushel of seed, is, I think, the surest and cheapest way to raise wheat with us; the favorite varieties at present are the White-Blue-stem and Mediterranean. Should suppose the average yield, with good cultivation, to be 20 bushels or over; the last crop was not half a one, owing to injury done by red weevils, the Mediterranean escaping with least injury. Sowing early varieties is thought to be the only way of escaping their ravages. I am inclined to think the yield per acre increasing. The average price for the last year at Sandusky city would be near 72 cents per bushel; and at different points along the Cleveland, Columbus, and Cincinnati railroad, a few cents less. Our best farmers seed their wheat in the spring, with clover or a mixture of clover and Timothy seed. The culture of wheat has been rapidly decreasing for several years; stock-raising being more profitable and congenial to the soil.

Corn I think our most important grain crop; and when connected with wool-growing or stock-raising, the fodder judiciously saved and fed will more than pay the entire cost of the crop. In a former communication to your office I gave the details, and will not repeat them here; but I have raised a crop that cost less labor per acre the past season, equal in quantity and better in quality, on the same piece of ground; and it is nothing more than any man can do. It is an expensive way of doing business to raise 15 or 20 bushels of corn to the acre. The premium at our county fair was awarded on a crop of 126 bushels per acre, raised without the application of manure, the ground never having been ploughed before; it has been worth 40 cents per bushel the last year.

As the culture of wheat declined, wool-growing increased, and this county ranks among the first for quality and quantity; all concede that it is profitable. As far as my experience goes, I would say that it costs equally as much or more to raise coarse wool as fine. Coarse-woolled sheep are not so healthy when kept in flocks of 100 or more, and appear to suffer more from cold rains than fine ones. My calculation is, that it costs about 24 cents per pound to grow wool. From 8 to 10 tons of good hay are sufficient to winter 100 head well. There are probably 50 lambs raised for every 100 ewes annually—rather less, I should think.

The *culture of fruit* is extending rapidly. Apples are produced of rare excellence, with the smallest amount of care. Pears, cherries, and grapes, as far as proved, leave nothing to wish for. I have had the Julienne,

Bartlett, Andrell, Leehel, and other pears. Fruit, for several seasons, fairer or finer flavored, have not been produced in the country, East or West. The finer varieties of cherries have failed but little, being of recent introduction, but promise well. The Catawba grape is as sure a crop as are currants, (our most hardy fruit.) The varieties of apples cultivated are numerous; nearly all the varieties that have much reputation in various localities have been tested. Some are suitable for culture here, but the majority are rejected. The Rambo, (late apple,) Sweet Bough, Yellow Harvest, Fall Pippin, Golden Russet, Sweet Putnam Russet, Danvers Winter Sweet, and Phillips's Sweeting, and perhaps a half dozen other varieties, would be worth all the rest. I think that for feed, apples are valuable for working-horses; a half bushel of sweet ripe apples per day, are worth more than that quantity of oats for calves and sheep. In the winter, when confined mostly to dry food, good apples are the very thing they want. An acre of good orchard, taken for 10 years, will make as much pork as two of corn, I am confident.

I tried an experiment in seeding with potatoes the past season, on four rows equal in length and quality.

No. 1.	Planted with large potatoes, produce.....	75	pounds.
2.	Planted with very small potatoes, produce.....	67	do
3.	Medium size, cut in two, produce.....	76	do
4.	Medium size, quartered, produce.....	70	do

All were planted at the same time, and same distance apart.

Hoping the day will soon come when agriculture will take the position its importance demands, and wield the influence it is justly entitled to in our glorious Union,

I close by subscribing myself yours, respectfully,

BENJAMIN SEARL.

To the Commissioner of Patents.

Kelley's Island, Ohio,
December, 1852.

Sir: Your Agricultural Circular for 1852 was duly received. In answer, I send the following observations:

Wheat.—Guano is not much, if any, used on our rich Western soils, where manure of most kinds is wasted, or removed from barn-yards, only because it is cheaper than to *remove the barn;* but more attention must soon be paid to manures. The average yields on old land are less per acre, instead of being better, as they ought to be, under good cultivation. The average yield of old wheat harvested this year in this township, will not exceed 14 bushels per acre—worth, for white varieties, about 80 cents; red, 5 or 6 cents per bushel less.

The best remedy for Hessian fly, known is this vicinity, is late sowing. Wheat sown in November is rarely much injured; and I have never known it wholly destroyed by them. The following recipe will always prove a specific for smut: Soak the seed in strong brine or lime-water (at temperature 100° when first put in) 12 or 14 hours; strain off the pickle, and sift on dry slacked lime. It may lie in this condition two or three days, if not sooner wanted for sowing, without injuring the vitality

of the seed. The system of rotation that has obtained here has been, two crops of corn and two or three of wheat; then corn, followed by wheat, when the necessity of seeding to grass and clover is seen. The soil is a clay loam.

Clover and Grasses.—I have found 6 quarts of Timothy and 2 quarts of clover to be a good proportion and quantity per acre sown on wheat, in March, on light, thawing snow. I have uniformly had a good *catch*, and hear of no complaint from my neighbors, who do likewise.

Corn.—For this crop I plough as deep as possible with the *furrow* plough. Then (on old land) follow in the same furrow with a subsoil plough 3 or 4 inches deeper. Thoroughly pulverize the ground as well as may be; then ridge—*i. e.* throw two furrows together 4 feet from centre to centre. On this plant the seed, in rows 4 feet apart and about 4 inches deep, leaving the seed a little below the average level of the ground. The deep planting prevents birds from pulling it up, and the ridging prevents water from standing on the seed, and is equally a preventive of injury from drought. The best time for planting here has been from the 10th to the 25th of May. Price in this market (Sandusky City) may be quoted, for 1852, at about 42 cents per bushel. The crop for this year is a light one, not exceeding two-thirds of an average yield. I have omitted further details on cultivation, as but little difference prevails with different farmers, unless it may be in hilling when hoeing it; which should never be done—*i. e.* with the gourd-seed variety, which is the only kind that I have much experience in. The best method of feeding it to hogs is to begin early—as soon as it is nearly out of the milk—while the weather is warm and favorable for fattening them, so that they may be ready for the butcher as soon as the weather is cold enough for packing.

Sheep and wool, like neat cattle, are unprofitable where land is worth $20 per acre, except to a very limited extent. The Paular or French Merino—those with fleeces that are gummy on the outside—I consider the most profitable, as the fleece is fine, long, and heavy, commanding the highest price in market, and the sheep are the hardiest variety that I am acquainted with. I do not think that land will yield $2 per acre per year net profit to raise sheep; and not so much for neat cattle, unless for fancy stock and prices.

Grapes are receiving increased attention in this vicinity. The only obstacle to extensive cultivation seems to be a want of knowledge in the management of them—trimming, training, &c. The Catawba and Isabella are the principal kinds raised. From such information as can be obtained from German and French vine-dressers who come to this country, the grape thrives as well here as in their own countries, and the wine made from them is equal to the foreign article. The fruit finds a ready market here at from $2 to $2 50 per bushel of 45 pounds, and is worth more to make into wine. Two hundred bushels per acre may be considered an average crop, yielding over $100 per acre net profit per annum on a capital of $250.

Yours, respectfully,

ADDISON KELLEY.

FEDERALTON, ATHENS COUNTY, OHIO,
November 21, 1852

SIR: The Circular from the Patent Office of August, 1852, has been received; and in answer to some of the queries therein contained, I make the following observations:

Wheat.—No guano is used in the production of this or any other crop; yield, from 10 to 45 bushels per acre—average about 15 bushels; time of seeding, fore part of September; of harvesting, first of July. As we are not troubled with smut, our seed needs no preparation except thorough cleaning. Quantity used per acre from 1 to 1½ bushel—the latter quantity is none too much on strong soils. Plough once in August, (if green sward or stubble land) ten inches deep; but a great deal is sown among standing corn the last of August and first of September, and ploughed in with the shovel-plough. This mode produces good crops on bottom lands. I am confident the yield per acre is increasing. We have no regular system of rotation in crops. On our bottom lands, corn succeeds corn forever, or wheat and corn alternately forever, without any sensible diminution in the yield. As to the best remedies for Hessian flies and weevils, perhaps it will not be proper to say I *know* of any; but I have an opinion, a speculative belief—a mere fancy, perhaps—in support of which, from the nature of the case, it may forever be impossible to array facts, tangible facts, sufficient to convince this fact *vs.* theory age that it is anything but the veriest whim. However, I will now state what I conceive would be a complete remedy for these mischievous insects, if it could be made available, (of which I have no doubt) and in fact what has always been the chief means of preserving the wheat crops of the whole country from utter destruction by their devastating energies. I have raised wheat on the farm where I now reside for the last forty years, and have never, except one year (about six years ago) been injured by the Hessian fly, nor by the weevil but once, and that was in 1827. This insect, I believe, has never visited this vicinity except at the time alluded to, when its ravages were extensive and terrible. But I hear frequent complaints of the "fly" almost every year. And now for the remedy: This consists in nothing more nor less than the fussy and feathery tribes of the air; and whilst it appears in the distribution of useful employments assigned, by a common Parent and Governor, to every order of animated nature, to the swallow in general, but more particularly to the chimney swallow, is assigned the duty of waging successful and incessant war during the warm season, and until late fall, upon those immense armies of insects which float in the summer breeze, the weevil and "fly" included. These birds, as is generally well known, procure all their food, consisting of insects, upon the wing. After their broods have been reared they partake of but two meals a day, breakfast and supper. In the morning, they range further; in the evening, they procure their food nearer their domicil. When feeding their young they are busy all day.

Now, if these birds can be multiplied to any desirable extent on every farm, I submit, whether their being so multipled would not insure our wheat crops against the ravages of all insects? That they can be so multiplied, there is in my mind, at least, no doubt, and with very little expense and trouble. They always build their nests and rear their young in chimneys. Wherever a chimney stands through the summer unused,

there you will find a colony of swallows; and if permitted so to stand a number of years, the colony will increase in numbers from year to year, until emigration becomes necessary for want of room.

That chimneys made of boards and attached to barns and out-houses, in imitation of real chimneys, at small expense, will attract their proper and natural denizens, is reasonable to suppose; then if the first great prerequisite to the increase of all beings is a place to be; and the next, food sufficient for their support; it follows, of course, that beings so provided for must increase in numbers agreeable to unalterable laws. I can muster but few facts to prop this theory, two of which have already been produced, viz: the swallow takes its food, consisting of insects, upon the wing. I have been but little, if any, troubled with the "fly." One more fact will finish the array. The house I live in has been built twenty seven years; it has two stacks of chimneys, with two flues in each, from the second floor. One of these chimneys, and one flue of the other, is every summer and fall exclusively devoted to the use of the swallows: here they are permitted to breed undisturbed, and all available means are resorted to, to remedy accidents; as, when a nest is washed down by a hard shower of rain with its unfledged occupants, it is placed in the crotch of a stick and carefully replaced up the chimney. Thus encouraged and cared for, my colony of swallows has become quite respectable in numbers, amounting to something like one hundred in October last. With such an effective corps of champions, I feel quite secure from the ravages of the Vandal fly.

In this connexion it may not be amiss to observe, that whilst affording shelter, protection, and encouragement to one class of birds, the rights and privileges of others are not forgotten; and so far as the influence, jurisdiction, or authority of the writer extends, no bird of any kind is allowed to be killed or injured in any way, or unnecessarily disturbed, excepting always such as prey on poultry or smaller birds. But there is great complaint in some parts of the country of the depredations on cornfields in the spring season, committed by some birds—the black-bird for instance—and no remedy seems to suggest itself to some minds but the destruction of the birds themselves. That is a sure remedy, so far as the individual bird killed is concerned. That a dead bird can pull up no corn, is a clear point; and that it can destroy no more worms, bugs, or other insects, should be equally clear, however much this last and most important fact may be overlooked.

This killing of birds for pulling up corn, resembles somewhat the biting of the hand that feeds us. What! kill your most devoted servant; your only efficient laborer in securing your crop from utter destruction; one who has toiled through the whole spring—has followed close upon your heels in every furrow you have turned; and when you have retired for rest and refreshment, still pushes its unremitting labors, crossing and recrossing in every direction the newly-turned furrows—all to clear the soil of those sure harbingers of fate to your crop, the worm? Such conduct would be better designated by any other appellation than one that denoted good economy, sagacity, or self-interest. But how to preserve the crop without killing the birds, seems to be a mooted point with some farmers. Many plans have been tried, and a number have proved successful; but the writer knows of but one that does not compromise the rights of any of the parties concerned, and that is to sow corn broadcast

through the field just as the planted corn begins to appear above ground, the amount to be regulated by the demand. In addition to this, if it should be subjected that there are many worms in the land, plough a furrow or two between the rows. I am sadly digressing; but, under a strong conviction of the importance of the subject, feel not much inclined to apologize. The price of wheat here is 60 cents per bushel, with an upward tendency. None of the grasses, technically so called, succeed well sowed with wheat, as a general thing; but clover does, if sowed in February or March, as the season is more or less forward. *Varieties:* The Mediterranean is generally preferred, on account of its supposed hardy qualities in resisting rust. The weight of this year's crop is 66 pounds per bushel. Several white varieties are being introduced, among which the Michigan or White-Blue stem is the most highly recommended. In the opinion of the writer, a sad deficiency exists in the cultivation of wheat. He can see no good reason why 50 or more bushels may not be the average product per acre, instead of from 10 to 20; his mark is made at 40, with a margin for 10 more. To this end, a more prolific variety, as well as improved modes of cultivation, may be necessary.

Corn.—Average product per acre, 60 bushels on bottom, and 30 or 35 on upland; cost of production, when harvested, 14 cents per bushel; market price 37½, with a prospect of higher rates. Best system of culture I do not exacly know. A very good one for bottom land is to plough deep, by which I mean from 10 inches to a foot; harrow thoroughly; and if there are many lumps remaining, roll with a short but heavy roller; mark out with a shovel, or one-horse plough, 3 feet apart, east and west, and a little wider (if the variety of corn be large) north and south. This work should be done with skill and care, as much depends, in the ease and cheapness of after-culture, upon having the rows perfectly straight. When the corn is up three or four inches, plough it out, two furrows in a row, with a one-horse plough; run the plough close to the hills turning the furrows from the corn. It will not do to intrust this work to a boy, at it will require the whole skill of a first-rate ploughman to do it well; a boy may follow to uncover and adjust the corn. So soon as may be required to keep the weeds in check, plough it the other way, and with a shovel-plough in case the corn has attained a sufficient size to admit throwing dirt into the hill without breaking off the stalks; if not plough as at first. The next, or third time ploughing, should be done with the shovel, run close to the corn; the fourth time with the shovel and three furrows to the row, and as shallow as possible. By this time perhaps other work, as wheat harvest, &c., must be attended to. But if you would raise a heavy crop of corn, it must be attended to also; for which purpose a steady, careful boy, with a horse to match, may be put into the field with a cultivator, which, for the first time, can now be used with advantage, and kept there until the ears generally begin to set, when the corn may be "laid by." If the corn be of a large variety, but two, or three at most, stalks should be left in a hill; if small, four may be admissible. It will be observed that I have not mentioned hoeing in the process of raising corn. The reason is, I do not consider it necessary, but rather that all the hoeing done to corn after it is planted is time and labor thrown away

For feeding cattle and horses, I think it better to grind the corn and cob together.

Clover and Grasses.—Quantity of hay cut, per acre, from 1 to 4 tons; average this year 2 tons. Timothy and red-top preferred for meadow, sown half and half. Cost of growing hay about $2 per ton. The mode of laying down meadow preferred, is to prepare the land as for wheat, and sow the last of August and first of September; or a better way, perhaps, should the fall prove dry, is to sow among corn in the first or middle of August. In either case, we always calculate on a heavy crop of hay the next summer. Heavy seeding is considered best; but cannot tell how much seed per acre is, or should be, used, as I always sow in the chaff.

Neat Cattle.—Cost of rearing till three years old, is $9; price of steers at that age, $20; of heifers, $15. Value of good dairy cows in spring, $20; in fall, if fresh, the same, or more; if dry, say $16. Steers should be broken to the yoke whilst quite young, say nine or ten months old. When first yoked, let them run in the yoke in a yard or small lot two or three hours every day, until they become habituated to the yoke, and to being yoked; if they turn the yoke, which is generally the case, tie their tails together, which will soon break them of this habit. They should be yoked up several times through the summer and fall. After they are a year old, and practised in all the evolutions you would wish performed by oxen, the succeeding winter they should be yoked once or twice a week, and put to drawing light loads. The third winter they should become thoroughly broken in, so that they understand the word and obey it.

Remarks.—In selecting steers for the yoke, judgment and skill are necessary; in temper, motion, build, and size, they should be alike; docility, mild temper, rather quick motion, a tight and heavy build, and large size, are the desirable qualities of a work-ox. If the opposite of any of these qualities are found in a steer selected for the yoke, dismiss him at once, and substitute another.

The task of breaking steers is commonly, but often improperly, assigned to the boys. It requires not only much skill and some science, but a great deal more patience than is allotted to boys in general, and to too few men. Steers, when under the tutorage of the teamsters, should never be struck a hard blow—should never be treated harshly, either by word or action; but the reverse. They should never be permitted to get away and run from the driver; but should this occur, let him be in no hurry to catch them; and when caught, treat them with the utmost gentleness, as though nothing wrong had transpired. They should never be hitched to a load they cannot draw easily—never should be "stalled"—never hurried when manifesting impatience and disinclination to pull or go ahead, but caressed till their "pet" subsides. When unyoked, it should be done at the time they are calm, and appear inclined to do the behests of their master. They should be put to constant hard labor before the age of six or seven years, when, if well cared for, they can perform as many days' work in a year as a man, without injury, and continue to do so until from fourteen to twenty years old.

Horses.—The growing of horses is undoubtedly profitable. The expense of rearing a colt until three years old is about $15. The best way I have ever found to break young horses for service, is to break them to the

halter when young—say in the winter after weaning; and occasionally habituate them to the bridle until three years old, then break them to the bit by reining their heads up and fastening the bridle reins to a crupper with a girth and martingale properly adjusted, and turn them loose into a lot by themselves. Do this an hour or two for a few days, until they appear to feel somewhat easy; then add lines and drive them about, until they have measurably learned all the evolutions necessary to a carriage or wagon horse. They (or he, more properly, for but one at a time can be thus handled) are now ready for the saddle or gears. For the gears I prefer using him alone, to putting him by the side of another horse. When properly geared, hitch to a light plough, and go to ploughing on light land, with a double line. Have a hand to lead him around a few times, and walk by his side a few times more around, and he will soon be manageable alone.

The remarks upon gentle usage to steers, apply to the breaking of colts with double force. Neither a stick, whip, harsh word, nor angry look, should ever be employed in breaking a colt; nor should he ever be jerked by the bridle or lines. Much care is necessary to prevent his acquiring the habit of breaking away or slipping the bridle when hitched to a post, by always fastening him with a halter which he can neither get off nor break. Other bad habits must be guarded against, by preventives; for when once acquired, the difficulty of eradicating them verges upon impossibility.

Potatoes.—Sweet potatoes only raised for the table. Of Irish potatoes, the average yield per acre is about 100 bushels; cost of production 25 cents per bushel. The best variety for table use (but not most prolific) are what we called in Vermont, when I was a boy, Blue-noses; cost of culture 25 per cent. more than other varieties; worth 50 per cent. more. I have been acquainted with this variety fifty years; in this time it seems not to have degenerated in yield or size. Whatever manure is best, leached ashes in the hill, and a handful of unleached ashes on the hill, are in most soils necessary.

Respectfully submitted:

ELMER ROWELL.

To the Commissioner of Patents.

Canton, Stark County, Ohio,
November 24, 1852.

Sir: Your Circular is received; and, in reply, I would say that there is no guano used in this region. The average yield of wheat in Stark county for the last three years is about 20 bushels per acre. *Wheat* being our principal staple, many efforts have been made to increase the product, the most successful of which is the ploughing under of *clover crops*. The usual method is as follows: First, ploughing in May for fallows; re-ploughed or "stirred" in September, and wheat sowed or drilled in from $1\frac{1}{4}$ to $1\frac{1}{2}$ bushel per acre. In February or March next succeeding, it is sown with clover-seed, from 8 to 10 pounds per acre. The usual practice is to pasture the clover after harvest. The next spring, in May, gypsum or plaster is applied, from 60 to 80 pounds per acre. In June, or early in July, about 2 tons of hay per acre may be made. The field may then

be left for seed, or for pasture, or again mowed for second-crop hay, or turned under for wheat. The usual method is to plough under the clover and seed with wheat, without any second ploughing. This method makes a crop of wheat every third year, and gradually improves the soil. If the soil becomes foul, or has a heavy sod upon it, one well-worked crop of corn will make it mellow. It may then be sown the next spring with oats, and then be in good order in the fall for seeding with wheat. We usually put stable-manure upon fields intended for corn, and lime, also, if there is much sour grass. The quantity of wheat produced per acre is gradually increasing. We have very few weevils of late; the Hessian fly, rust, and late frosts are our most serious evils, for which we know of no effectual remedy. Early-sown wheat is less liable to rust, because it ripens earlier, but is more likely to be injured by the fly, especially if the fall is late and warm. The best varieties of wheat are the Soule or Yorkshire flint, the Genesee white, and the white Bluestem. These varieties, for extra flour, are worth from 3 to 5 cents per bushel more than the common red wheat, and from 6 to 8 cents more per bushel than the Mediterranean. The red varieties, however, are all more hardy than the white. The Mediterranean is so hardy and of such vigorous growth that the ravages of the Hessian fly have very little effect upon it; but they are all so much lower in price that they are rapidly giving place to the varieties first mentioned. There is another subject connected with wheat-growing worthy of remark: it is of great advantage to procure seed-wheat from a distance, even though the distance be but a few miles and though the same variety of wheat be procured, experience having fully established the fact that wheat will deteriorate unless a different variety is sown, or new seed obtained. Average price this season per bushel of 60 pounds, 70 cents at Canton, and 75 cents at Cleveland; price now, 83 to 88 cents.

Clover and Grasses.—Our average is about 1½ ton of hay per acre. Timothy and clover mixed make our best upland meadows. Red-top and Timothy are considered the best for low lands. Red clover is not injurious to horses.

Dairy Products.—We make very little cheese in this county. A good cow will yield 200 pounds of butter per year. Our best butter-makers have what we call a "spring house"—a small building of stone or brick, with large shallow troughs, through which run streams of spring-water. After milking and straining, the pans or crocks of new milk are placed in these water troughs, and the cream soon rises to the top. The barrel-churn is the kind in general use here. To preserve butter in warm weather for a week, it must be worked over until the milk is all expelled; to peserve it for winter use, it may be packed in stone jars, containing about 20 pounds each, with 1 pound pulverized rock-salt, ¼ pound loaf sugar, and ½ ounce saltpetre. The crock or jar should then be covered, first, with a clean white cloth, and then with drilling or heavy muslin, dipped into a preparation of melted tallow and beeswax, and bound round tight with wire, to exclude the air, and then deposited in the spring-house for winter use. I assisted in preparing butter on the above plan for the California market, and it was sold there, fresh and sweet, for $1 50 per pound. Butter here is worth from 10 to 12 cents per pound in May and June, and from 15 to 16 cents per pound in the winter.

Cattle.—It is worth about $15 to raise cattle to 3 years old, and they are then worth about $20. A good cow is worth $20 in the fall, and $25 in the spring.

Horses.—It is worth $35 to rear a colt to 3 years old, and it is then worth from $45 to $55; at 5 years old, $75 to $100 each.

Hogs.—Best breeds, Berkshire, and Berkshires and Leicestershires, or grass breed crossed; cheapest and best food, grass and corn.

Sheep and Wool.—No wheat-grower should be without sheep; it is profitable to grow wool, and the business is rapidly increasing. Our native sheep are the most hardy, and yield the heaviest fleeces; yet, taking the price into consideration, the growing of fine wool is the most profitable. Large sheep are the most salable for mutton, but they generally produce a coarser fibre of wool.

Potatoes.—Long reds most productive; average yield, 150 bushels per acre. Meshanocks and Pink-eyes, best for table use. But few sweet potatoes raised.

Fruit.—Quantity and quality improving. Fruit-growing would be quite profitable here if it were a certain crop—frequently injured by late frosts; sweet apples are about as good for hogs as potatoes, but not so good for cattle or horses. A free use of urine will prevent blight on pear-trees.

Yours, truly,

MADISON RAYNOLDS.

CUBA, CLINTON COUNTY, OHIO,
November 1, 1852.

SIR: I offer to you a few remarks on crops, as I am a friend to agricultural science, and am always willing to give any information in my power.

Wheat is the principalcrop raised in this (Clinton) county. The principal varieties are the Mediterranean, the Red chaff bearded, the Rock, and the Golden straw. The first named was generally raised in this section till last fall, when farmers concluded to sow the Rock wheat, which is, in my opinion, the best variety we have; it does not weigh quite so much per bushel as the Mediterranean, but produces more and better flour, and is harvested about the 4th of July; the Golden straw ripens a little later than most other kinds, and is therefore liable to rust. The best manure for wheat here is clover sod and lime; the land in this county lacks lime for wheat. The average yield per acre is about 12 bushels.

Oats.—I have tried the common black oat and the large white oat. Both kinds answer well; the former grows taller on poor land than the latter, ripens a little later, and weighs heavier, but does not look so well, owing to its color. The cultivation of oats is becoming unpopular among our best farmers, believing that it impoverishes the land more than Indian corn; but upon the whole I think it the best and cheapest feed for horses and oxen. Average price at Cincinnati market, 25 cents per bushel.

Rye not much cultivated; therefore, can say nothing of it.

Indian Corn.—There are many varieties of this grain raised in this county. The large white is mostly grown for bread, but the yellow flint is the strongest feed for stock, containing 5 per cent. more nutriment than

any of the white. The average per acre is 40 bushels. Corn is worth at this time 40 cents per bushel at our nearest market. Corn blades are excellent food for sheep, cows, and horses; for sheep they are superior to the best hay.

There are a great many meadows in this county. Timothy is extensively raised for seed; herdsgrass and red-top are grown for the market; and hundreds of tons are taken in bales on the cars from Westborough to Cincinnati, where it brings from $9 to $18 per ton.

Clover is raised for manure and for seed; the seed bring $4 per bushel. Clover makes an excellent manure; it should be ploughed under in September, while in blossom; and for wheat crops it is better than plaster. Many are burning lime to spread over their fields, which has raised the fertility of the soil so that 75 bushels of corn may be as easily raised on an acre as 25. The average in this county, as stated above, is 40 bushels of corn to the acre; but we think it will increase.

I am, respectfully, your obedient servant,

S. S. G. FRANKLIN.

To the COMMISSIONER OF PATENTS.

MARION, MARION COUNTY, OHIO,
November, 1852.

SIR: Your Agricultural Circular, directed to my address, was received in due time. My remarks will be brief, and confined to a few items in which I have the most *practical experience* and *success*, and will be limited to the products of this county.

Corn.—Guano is not used for this crop. Our average product per acre, taking the whole county, is known to be between 40 and 45 bushels per acre; for this year I put it at full 45 bushels. Whilst this is the average, there are some few whose annual crops are 80, 90, 100, 110 bushels, or more, per acre. My own crops, for eight years past, have ranged from 80 to 110 bushels per acre, whilst some of the adjoining crops, on soil equally good, have not exceeded one half that amount; and I attribute this difference wholly to the *care* and *attention* bestowed in the one case, and neglect in the other. I haul out my barn-yard manure in winter, generally on a sled; plough early in the spring, with four good oxen, and go as *deep* as they can well go through; when a little dried on top, I harrow well, and mark out 3½ feet each way; plant from 1st to 10th of May; much depends on the quality and productiveness of the *seed:* this I select when gathering my corn in the fall, using no ear having less than 16 rows, some as high as 22 to 24 rows, and having from 800 to 1,100 good kernels; carefully drop, in the right place, 5 to 7 kernels, covering full two inches deep. When fairly up, I run a small mould-board plough, two light furrows in a row, throwing the earth from the corn; in five to six days, I again plough (crosswise) in the same manner, and *this time* hoe carefully, and where more than four stalks of corn are in a hill, thin them out, leaving the *four most vigorous;* in ten days more I plough, third time, and now throw the earth *to* the corn, and plough some deeper, also use the hoe to right up corn and remove all the weeds; in ten days I again (fourth time) run the plough twice in a row, and throw the earth to the corn, and this time plough *deep;* if the

weather is dry, in eight days more I again run the shovel-plough through *once*, each way, (5th time,) and plough as deep as the horse can well draw. It is now done with until it is dry enough to cut up. I haul out 8 loads manure per day, enough for one acre: cost, $2; ploughing with 4 oxen and 2 hands, $2 75 per acre; harrowing with 2 horses, 33 cents per acre; planting, 75 cents per acre; a boy and a horse will plough, twice in a row, 4 acres per day: say 5 ploughings and 2 hoeings, $2 25 per acre; cutting and stacking, $1 25; whole cost, $9 33 per acre. Crops thus managed will average—say 90 bushels per acre, and is worth in the shuck 25 to 33 cents per bushel—this year 33 cents; if sold for feeding, it is not husked; if husked, the fodder will well pay for husking; (10 acres of this fodder will well keep through the winter 15 head cows and steers;) 90 bushels at 33 cents is $29 70; deducting expenses, will leave over $20 per acre. This will pay taxes and interest on $300, though the value of this land is about $25 per acre. These lands are "plain," (prairie,) and will give 33 per cent. more corn, generally, than cleared woodland. Our corn crop is the most certain crop we raise; more profitable, and far more *certain*, than a wheat crop, and is less affected with the early drought than the hay crop.

Hay crop.—Our *average* crop of hay is between 1½ and 2 tons per acre. Seeds preferred for "plains" are Timothy and clover, two-thirds of the former and one-third of the latter, sowing 6 to 7 pounds per acre. Counting the grass at $2 per acre, hay, in the stack, *costs* about $2 50 per ton.

My experience is that "red clover hay," cured in the *sun*, is injurious to horses. Where my grass is *all*, or nearly all, red clover, after being cut and well wilted—say five to six hours in the sun—I put it into small cocks that will make 60 to 70 pounds hay, when cured, and leave to make four to five days. If showery, put green clover or fine grass on top of the cocks to shed the rain. When well made turn the bottom of the cocks to the sun two to three hours before hauling in. Clover hay thus made will retain nearly all its leaves and blossoms, and is, I think, much better.

Natural Meadows.—Our *plains*, as also most of our uplands, afford the best natural meadows I have ever met with. There is a very large spontaneous growth of blue grass, June grass, Timothy, red and white clover, red-top, &c., &c., which give a continuation of the most nutritious pastures, from early spring to hard winter; and, where cattle are shut off from the 1st of September to the 1st of December, they afford tolerable pasture through the winter, when not covered with snow and ice.

Neat Cattle.—"Cost of raising till 3 years old," I put at 40 cents per month, or a cost of $14 40; 3-year-old steers are worth $25 to $30; heifers, $15 to $18; good dairy cows, in the spring, $20 to $25; in the fall, $15 to $18. Permit me here to add, that for eight years past I have practised raising *calves* from grade Durham and *good* common cows, got by full Durham bulls, leaving the calves, as soon as they can suck *all* the milk, to run with the cows in good rich natural pastures until they are 6 to 7 months old. At this age they generally weigh from 600 to 750 pounds, live weight, and are worth from $15 to $25 each, and are readily sold at these prices, even to the butcher when retailed at 6¼ cents per pound for meat; hide and tallow, they come to from $20 to $25. A heifer calf of my raising, 7 months old, killed a few days since, averaged

over 80 pounds per quarter; the two kidneys, cut from the hind quarters, with the usual tallow attached, weighed 45 pounds. The calf had nothing but the milk of its dam, and she no feed but the usual pasture. Is not this much better than to *stint* them for 18 months, then send them to New York, or Brighton, and there to sell at $7 to $9, the present quoted sales of yearlings in those markets?

In August I lost four calves, (from an unknown disease,) the largest and fattest of the herd. The first one, I opened and examined carefully, (I had refused an offer of $30 for it a week before;) the centre of its heart and part of its liver was mortified. In a few days I lost two more: one showed as healthy and beautiful meat as I ever saw; the other, though opened in 30 minutes after death, had its entrails so mortified as to drive us away. I then bled and gave physic to the balance, (10 of them,) but lost one more in a few days. Those that died were two Durhams, one three-quarter and one one-half blood; the four were worth at least $100. I attribute their death to their great fatness, and the extreme heat of the weather; my thermometer ranged from 94° to 98° in the shade, some days. I first discovered their illness by their refusing to suck. They died in 18 to 24 hours after being taken. My intention now is, in future, to bleed them once or twice during spring and summer.

Oats for Milch Cows.—In November, 1851, I had a cow come in fresh. She was old, but an excellent milker. I fed hay, corn fodder, and corn in the ear; most of the corn passed through her whole. She lost flesh and fast shrunk her milk. I quit feeding corn, and fed six quarts of oats per day; in five to six days she increased her milk from 50 to 60 per cent. Oats at 20 cents a bushel made a day's feed of six quarts, four cents per day, while the *increase* of her milk was one gallon and a pint per day, equal to 17 cents; this was a daily interest of 300 per cent. on the oats fed.

As I fed and milked this cow, and do a daily portion of the work on my farm, I profess to know something of what I have here written.

I will now close my remarks by copying a few items from my "annual report of Marion county" (just written) for the "Ohio State Board of Agriculture."

Wheat, average crop this year, 15 bushels per acre.
Corn, average crop this year, 45 bushels per acre.
Oats, 30 bushels per acre.
Clover seed, 4 to 5 bushels per acre.
Timothy, 5 to 8 bushels per acre.
Sheep and Wool.—100,000 sheep and 285,000 pounds of wool; average value, 40 cents per pound.
Pork.—Quantity uncertain from constant sales and transportation.
Beef annually raised in this county, 6,500 head; average value at four years old, $35.
Beef annually *fatted* in this county, 11,000; average value at four years old, $35.
Horses annually *raised* in this county, 1,200; average value at four years old, $70.
Horses annually kept in this county, 7,500.

Respectfully,

JOSIAH S. COPELAND.

JEFFERSONVILLE, FAYETTE COUNTY, OHIO,
December, 1852.

SIR: In compliance with your request in the Agricultural Circular of August, 1852, I proceed to make such suggestions as may be profitable to the agriculturist in our part of the world. The soil in Fayette, as well as in some of the adjoining counties, is generally very deep and rich; its greatest fault is in being too low and wet, which, however, can be speedily remedied by draining at a much less cost than soil in more dry and sandy localities; the past experience of agriculturists in this county proves that deep draining and a proper rotation in crops will not only keep up our soil, but make it produce better and better every year without manure of any kind.

Wheat.—This crop is not cultivated to any considerable extent in this county, our soil not being very well adapted to its growth; the yield, however, is on the increase as our soil becomes older and better systems of cultivation are introduced. It is a common practice among farmers to seed corn land after the corn is cut up, which is generally later than it should be sown, as it is more liable to winter-kill than that which is earlier sown. The better plan, however, is to seed fallow land which should be broken up the forepart of summer, stirred again just before seeding, pulverized with the harrow, then sow and harrow in well, and if a heavy roller be run over the ground, it is the better, as it "spews" up less in time of freezing. Average yield per acre, about 15 bushels; best variety, Golden shuck and Mediterranean.

Corn.—This crop is more generally cultivated than any other with us, our soil being well adapted to its growth, and the cost of production not exceeding 9 or 10 cents per bushel, clear of ground rent. Mode of cultivation, on sod and other strong lands, is to plant, by means of drilling machines, in rows 3 feet apart, stalks from 6 to 12 inches apart; two ploughings with a cultivator are thought to be tolerable tillage; average yield, 60 bushels per acre; average price, 25 cents per bushel, in the field. A great portion of our corn is bought up annually for the purpose of feeding cattle. Manner of feeding is to haul out corn and fodder together, scatter them abroad on the ground, and let the cattle help themselves, while at the same time two hogs to the bullock thrive and do well on the litter. This causes the feeder to have two feeding lots, that, while the cattle are in one, the hogs are in the other; and thus change every day.

Barley not cultivated.

Oats limited; thought to be very exhausting to land; average yield, about 40 bushels per acre; average price, 20 cents per bushel; quantity of seed to the acre, 1½ bushel.

Rye is coming into general favor among farmers; is thought to be a great renovator if it is (as we term it) "hogged down on the ground." Some prefer it to clover, as it affords good fall and spring pasture, and gives hogs a fine start after harvest before corn-feeding. Rye two years, and then corn, is a good rotation.

Clover not much cultivated for anything except hog pasture, and as a renovator. Whether it is injurious to horses or not I cannot say; but it is not to hogs I am certain.

Timothy is generally preferred in laying down meadows; quantity of seed per acre, one gallon; quantity of hay, from 1½ to 3 tons per acre,

without any other manure than the droppings of the stock necessary to eat off the fall pasture, and such of the hay as is not fed to horses in stable; meadows may be kept up for any length of time; cost of growing hay, including ground-rent, $1 50 to $2 per ton; usual price of hay in stack, $2 50.

Neat Cattle.—Cost of rearing cattle till 3 years old put at from $15 to $18 per head; usual price at that age, from $20 to $25 per head. Good dairy cows vary from $18 to $25 per head, according to quality, always bringing the highest price in the fall, if promising well as winter cows. A given amount of food, it is generally conceded, will produce more meat in a Durham than in a native animal by one-fifth; the Short horned Durhams having the preference.

Horses.—The growing of these animals is profitable at present prices. Cost of rearing a colt till three years old, $36 to $40; usual price at that age, $60 to $80. Mules cost from $25 to $30; usual price, $80.

Wool-growing is on the increase, and is found to be profitable. It is probable that the growing of fine wool is most profitable, as the small fine-woolled sheep are far more hardy than the larger coarse-woolled sheep, and can be kept in good order on such living as would in nowise support large ones. The cheapest method of wintering is to have good winter pasture, feeding only in severe weather—in times of snow; and then corn-fodder is best.

Hogs.—We can boast of being able to produce pork as cheap as can be done almost anywhere. The Grazer, from his disposition to fatten at any age, has the preference. The cheapest method of producing pork is to graze all hogs, six months old and upward, from May till July, on clover, without grain of any kind; then put them on rye six weeks or two months; after which they will require but little feeding till ready for maket. Spring pigs are frequently put into heavy market; but this needs closer attention and more grain, as it requires also a plentiful supply of rich swill all the time. Older hogs thrive better, and yield a better profit from fall feeding, if grazed in summer.

Root crops in general not cultivated as field crops; but are confined, as a general thing, to the garden, or cultivated for table use only. Potatoes are undoubtedly a good feed for hogs, but are considered too much trouble, as they are of little value without cooking. Best manure for potatoes, half rotted straw or leaves, applied at the time of planting.

Fruit is not cultivated beyond a necessary supply for home consumption, or rather for table use only; not relied on as feed for stock or exportation.

Manure.—Very little attention is paid to this article further than to remove the unavoidable accumulations in stables and barn-yards to the garden, or some poor spot in the field.

Thus I have glanced at the most prominent points in agriculture in this vicinity, deeply regretting that my effort is so feeble; but such as it is, I place it at your disposal.

Very respectfully,

H CREAMER.

To the Commissioner of Patents.

ADRIAN, MICHIGAN, *December* 16, 1852.

SIR: To such of the questions contained in the Agricultural Circular from your Office, sent me, as I am able to reply to, I proceed to give you such answers as I believe to correspond with the experience of this part of the country.

Wheat.—Up to the present time the average product of wheat per acre in this State has not exceeded ten or eleven bushels; yet the average product where the land has been properly cultivated and manured has not been less than twenty bushels, and in isolated instances has reached from fifty to fifty-five. Like the other new States, Michigan was settled principally by persons of limited means, whose inability to procure the necessary aid for cultivating the soil well, and the necessity of relying almost entirely upon their own labor for clearing and tilling their lands, have led to the most negligent culture, and to such successive croppings of their limited improvements as have, in a great measure, exhausted the soil before they began to restore to it any of its original fertility. With them cheap cultivation and quick returns were a necessity. The average product per acre may now be said to be increasing, and will soon be double what it has ever been heretofore.

Farmers are using now a larger quantity of seed than formerly; not less now than a bushel and a half per acre, while formerly the average did not exceed a bushel. It is usually sown broadcast without any previous preparation, though some of our best farmers first coat it with plaster or lime, expecting thereby not merely to manure it, but also to prevent smut.

Summer fallowing is still general, though gradually, I think, falling into disuse, and once ploughing from 8 to 10 inches deep is being substituted. Opinions differ greatly as to the comparative merits of the two modes.

The average price of wheat at Adrian the present year has been 70 cents; at Toledo, 74.

Corn.—I think the average product of corn in this county about thirty bushels per acre, and the cost of production, harvest, and thrashing about 20 cents per bushel. The soil of the county will produce one hundred bushels per acre in favorable seasons, with good culture, and crops still larger have been produced here. The price of corn varies from 31 to 48 cents per bushel, and it is, therefore, a much more profitable crop than wheat. Corn is usually planted in hills of three or four stalks each, about three and a half feet apart each way. A much better mode, I think, is the planting of one kernel in a place in rows from three to four feet apart; the kernels to be dropped—say twelve inches apart in the rows. The advantages of this mode are obvious. The roots of the plants are more evenly diffused over the ground in search of the moisture and nutriment; the hoe meets with less difficulty in reaching the weeds about the stalks, and the plants shade each other less. The rows should be planted north and south, to give the sun access to the plants.

Corn is fast becoming the most important crop of the State. The quantity raised is now greater than that of wheat, and its higher comparative price is inducing every year a still more extended production.

Wool-growing is universally believed to be profitable, which is, perhaps, sufficient evidence that it is so. The crop is annually increasing, the amount exported from this county the present year being about

270,000 pounds, which was purchased from the farmers at an average price of 31¼ cents, and the most of it resold, before leaving the county, at an advance of from 2 to 3 cents. This amount, of course, includes no portion of that retained for manufacture in the various wool factories of the county, and in families. Grade sheep are, as yet, by far the most common, though the French and Spanish Merino, and Leicestershire, are being gradually introduced. There are also some flocks of Saxon, but they are not general favorites, and will be supplanted among the growers of fine wool by the larger and heavier-fleeced Merinos. Near the large villages and cities, where mutton is in good demand, the Leicestershire is undoubtedly the most profitable breed for the farmer, and is believed by many to be the most profitable everywhere.

Fruit culture is receiving increased attention every year, and large numbers of the choicest varieties of apple, pear, cherry, and peach trees are now being sold among our farmers by the nurserymen of this State, Ohio, and New York. Apples, however, are not as yet grown for food for stock to any considerable extent. The best varieties for winter use, and for exportation, are the Yellow Bellflower, Newtown Pippin, and Spitzenberg. Next to these are the Sweet, the Roxbury Russet, the Talman Sweeting, the Bellmont, the Vandevere, and the Greening; but the value of the last, for market, is diminished here by the circumstance of its not keeping so well as in New York and New England, where it is at its prime from January to March, while here it begins to ripen by the 1st of November. The Baldwin, the farmer's market-apple of New England, and the Northern Spy, equally famous in western New York, are as yet but little tried among us. The Yellow Harvest, early and late Strawberry, Fall Pippin, Hawley, and Rambo, are the best summer and fall market-apples; but the market is usually overstocked at those seasons, so that the cultivation of the best keepers among good varieties is much the most profitable, and, I think, more profitable than anything else in which a farmer here, with a small capital, can engage. Good winter fruit sells readily here at this time for 50 cents per bushel, though the crop has been an abundant one.

We are not as yet troubled to any great extent with the blight on apple or pear trees, nor with the yellows on peach trees. More difficulty is experienced with cherry trees than with any others. The tree is being often destroyed, or rendered unsightly and unhealthy, by the bursting of the bark on one side—usually the side exposed to the sun—leaving the wood at the opening to deaden and decay. The difficulty seems to consist in a too rapid growth of the wood for the growth of the outer bark, and the remedy needed is something to check that growth. Seeding down the cherry orchard is one remedy. Perhaps root-pruning would be less likely to diminish the size and quality of the fruit. Pealing off the outer bark is recommended by some Western pomologist, and I have seen it tried, on a small scale, the present year, with apparently good success.

Grapes.—Our native grapes, the Isabella, Catawba, and Cluster, grow luxuriantly here, and produce abundantly, but are not cultivated for wine, except to a small extent for sacramental purposes.

Root crops are by far the most profitable of any of the crops raised by the farmers for feeding stock, and it is matter of great surprise that they are not cultivated to a greater extent than they now are. Rutabagas,

sugar-beets, and mangel-wurzels can be raised on the lands of this county at a cost varying from 4 to 7 cents per bushel, including the expense of harvesting and housing; and a clear profit of from 200 to 400 per cent. on the expense of raising them is thus realized. This fact is beginning to be understood, and, together with the fact that by feeding them so much more stock can be kept on the same number of acres than by raising any other crop for that purpose, are introducing them to general favor. A fair crop of either of the above roots is 500 bushels per acre, but with extra care and cultivation 1,200 bushels may be raised.

Carrots will not yield quite so much per acre, and, as they require the same care, they cannot be produced so cheaply. They are, however, believed to be more valuable than the rutabagas, and equally profitable to raise.

Tobacco is now being cultivated here to a small extent, and promises to be extremely profitable. I think its cultivation is destined to increase very much within the next two or three years.

Yours, very respectfully,

THOMAS M. COOLEY.

ROMEO, MACOMB COUNTY, MICHIGAN,
October 8, 1852.

SIR: The annual agricultural fair for this county has just closed at this place. There was a good display of all kinds of agricultural, mechanical, and ornamental products. This is but the third year since a fair was first held in this county. The principal products of the county are wheat, oats, corn, hay, and potatoes; of each of these there were fair specimens. Of horses, the display was fine, from the yearling to the full grown horse. The breeds of horses have very much improved within a few years. Of stock, there were Devons and Durhams, and crosses of both with natives. Of sheep, the assortment was large, from the full-blood Merino and Saxon to the Bakewell and Southdown. Of hogs, the number was not large nor anything extra. Butter and cheese were, probably, as good as are made in the State. The judges on butter were puzzled to decide: there were so many specimens, and all so good, and so much alike. Indeed, the large number and variety of articles and animals entered for premiums speak well for the enterprise of our farmers. This is one of the smallest counties in the State, but it is settled by emigrants from New England, New York, and New Jersey, with a sprinkling of Irish, Scotch, English, and French Canadians, who are all industrious, and improving in property and intelligence.

Fruit.—The variety was large, particularly of apples. One farmer had 54 varieties, others 40 and 20; some very fair and fine flavored. The best varieties are the Spitzenberg, Rhode Island Greening, Northern Spy, Seek-no-further, &c. The lateness of the season made the display of other fruits smaller than they would otherwise have been. Of articles in the domestic and needle-work department, the display would well compare with any of the State fairs; showing that our ladies are as enterprising and industrious as the lords of creation.

The crop of wheat this year has been about an average one; the straw was light and short, but the berry plump. Corn is a very poor

crop; oats the same. Hay, light. Potatoes, about an average; but little complaint of rot. The summer has been a very dry one. Wool has been a good crop; the clip in this county will probably reach 150,000 pounds. Of this amount, over 80,000 were brought in this village; the price here averaged about 32 cents. Last year the amount purchased here was about 60,000, at an average of about 36 or 37 cents. There are in this county nine flouring mills, and all find enough to do nearly the year round. Besides, a large amount of wheat is yearly shipped east to Rochester, and sells in New York as Genesee flour.

Very truly, yours,

C. F. MALLORY.

ADRIAN, MICH., *December*, 1852.

SIR: Your Circular, among other things, asks for suggestions on the subject of forests. No branch of agricultural industry is of greater importance than the combined appliances of the forest; and accordingly I offer a few thoughts upon it. In most of our States, the question now is, not how the wood-lands shall be most speedily cleared of the trees, but by what management shall the necessary calls for wood, in its different uses, be most economically answered, with the smallest inroad upon the standing timber? Even in our new States a good "wood-lot" is often considered the most valuable on the farm.

Two questions are involved in the preservation of these forests—how may the uses of building material and fuel be economized? and how far may the products of the forest be increased and improved in quality by proper management?

With the greatly-improved modes of generating heat for domestic and manufacturing uses, not more than half the amount of fuel is required now that was consumed 10 years ago.

Iron and glass are displacing wood for the frames and finishings of buildings, water-craft, carriages, furniture, and in many other branches of art. Iron and glass are fast gaining ground where strength is more needed than bulk, and where durability is an important consideration. I do not now wish to discuss the economies of wood after it has been taken from the forest. How much and how good the wood that we may get from woodland, consistent with the least deterioration of the permanent value of the forest, is a question that more immediately concerns the land owner. The oak is the most valuable of all our woods. It is the most generally diffused, and it is put to the greatest number of good uses. It is well known that the most valuable timber is that which has attained its growth with most light and air. The wagon-maker takes care to combine toughness and durability by selecting his wood from trees of second growth, or from trees of first growth that from infancy have stood alone or far apart. Acting on this hint, we could cull out such of the oaks as are unsound first, giving those that are left more light and air. It is a fact in vegetable physiology, that motion facilitates circulation, and that young trees confined to stakes do not form their bodies so rapidly as when left free to the moving influence of the breeze. The thinning should be carefully effected, too; for the sudden exposure of the body o a tree to the light after it has been shielded for centuries from the rays of the sun is frequently fatal to it. The growth of a tree which has

always been closely hemmed in and guarded by its fellows has a form so different from one of the same species that has sprung up and come to maturity in open ground, that the identity would scarcely be recognised. Thus the black walnut in a close forest is a tall, naked shaft, with often but a few short branches at its top; while in the open field it grows low, round, and spreading. I have often recommended the white wood for the avenue, or as a very fit tree for private grounds, and have almost as often been asked if that tall, naked tree, out of which so much lumber is made, could be beautiful.

How often does the woodman's axe itch for contact with the tall, naked column of the white ash, whose tempting softness is destined to be unfelt until he shall have disposed of some harder specimens. As a lawn tree, the white ash becomes short and round, close and symmetrical. The experiments of hundreds in attempts to develop the sylvan beauties of wild-wood have failed from sudden and indiscriminate thinning. I have seen the fruits of it on my own ground. A narrow belt of forest, composed of oak, linden, hickory, and elm, was left, a few years ago, on the front of a sloping field—noble old oaks some of them were while standing in the thick forest. I had hoped that exposure to the light would force them to throw out branches from their naked bodies, and that some of these days a pretty grove would be the result, as many more sound trees of a younger growth were left as body-guards to shield their stems. These younger have done their duty well; but the old ones struggle on from year to year, and refuse to be comforted by the youthful family around them. Some of them have thrown out a few weakly branches, but as many more look as if beginning to decay. I shall, after all, look to the second growth for my permanent and most beautiful shades. The difficulty in this case was, that the wood was too suddenly thinned. Two-thirds of the large trees had been cut out of the belt nearly at once, judging from the appearance of the stumps, and *all* the trees on either side. Owners of wood-lots do not attach sufficient importance to their nut-bearing trees. It will not be very many years before the hickory, black walnut, and chesnut will have become so scarce as to possess a value for the fruit which they might produce quite exceeding that of most orchard trees. But a small portion of the hickory trees in forests where this is the prevailing tree bear well, if at all. The good bearers should be saved and cherished. There is so much difference, too, in the quality of the nuts—nearly as much as in the fruit of a seedling apple orchard—that great care should be taken in selecting the trees to be spared the axe. Some claim to be able to judge of the character of the nuts by the number of leaflets in a leaf. I do not know how far this test may be relied on.

In forest labor there is quite too little attention paid to the fact that some trees are impatient of removal, and that such should be cherished on their natal soil. The hickory, for instance, is very difficult to transplant; indeed, I do not recollect ever to have seen one of the common size for transplanting live long after removal. We should act upon the hint, and encourage it to give us the greatest possible beauties in the place where it germinated. Few of our Western farmers realize that they have been guilty of a great barbarity when they have "cleared" their last field, without having left a hickory upon the farm. With this tree utility and beauty go so hand-in-hand that such wanton destruction is quite

inexcusable. In beauty and thrift, there are few round-headed trees equalling the hickory.

Thorough draining will much improve a forest, not only in the increased growth of the trees, but in the greater comfort of getting about in it. All, or nearly all, woods are closer and firmer on a dry than on a wet soil. Often the vegetable matter that forest ditches afford would pay very well for the trouble of cutting them; and, generally, it will be found that these drains will effect quite as favorable a change in the forest crop as in the field crop, though their influence would not be perceived so immediately.

It is becoming an object in the old States to *make* forests for timber. On sandy soils, and such as compose the Western prairies, the locust grows so rapidly that it soon arrives at a size profitable for many uses. On a moderately rich, sandy soil, the yellow or seed locust, if not sown too thick, is large enough at eight years old to make good fence posts, and would do very well for the rails of a "post-and-rail" fence. The sprouting propensity of this tree precludes all necessity of replanting. The character of the locust for durability is such that, if possible to get, it would very generally be used for railroad ties.

A prairie or New England farmer could hardly make a surer provision for his children than to make a locust plantation of a portion of the land he holds in reserve for them.

Respectfully, yours,

WM. H. SCOTT.

To the COMMISSIONER OF PATENTS.

YPSILANTI, WASHTENAW COUNTY, MICHIGAN,
December, 1852.

SIR: My remarks, in compliance with your Agricultural Circular, will apply chiefly to a light, sandy soil, with occasional tracts of more or less clay—what were oak-timbered openings and plains. Climate, somewhat milder than same latitude east of the lakes. It should be understood, also, that the standard of farming embraced in this information does not take in all that are engaged in this business. A portion of the farming community does not seem to regard with much care the necessity of doing things at the right time, and in the right manner; and the result is a less average product per acre.

No guano is used here.

Wheat.—The average product of wheat is 20 bushels per acre; time of seeding, between the 1st and 20th of September; harvest, between the 8th and 20th of July. There is not usually any preparation of seed, other than the selection of good clean seed. I have known of some who have rolled their seed in plaster, and it seemed to produce much better for it. The usual quantity of seed is 1½ bushel per acre. Formerly, the best farmers ploughed 3 times before seeding; now, more plough but twice, and many but once; afterwards cultivate. We plough about 7 inches deep. The yield per acre is increasing, owing, I think, to better farming. The rotation of crops is, to sow wheat—seeding to clover the next spring; then, 2 crops of clover; and after that, wheat again. If corn is planted, oats generally follow, at the same time seeding with clover. The best remedy for the Hessian fly is to sow

between the 15th and 20th of September, giving time for a frost before the wheat is up enough for the insect. If the insect should get in the wheat, the best method is to turn on sheep, and feed it short in the fall. We have not been injured by the weevil; it is said to be well to sow early to guard against it. The average price of wheat at our market, Ypsilanti, during this year, has been 75 cents per bushel; it now sells for 82 cents. If our soil has been once *well* ploughed and afterwards well pulverized, either by the plough and drag or by the cultivator, so that all grass, weeds, and foul stuff are wholly eradicated, and good clover seed is sown upon it early enough in the fall to get a good top, and no water is allowed to remain on or near the top of the ground, we are sure of a good crop of wheat; provided the ground is not exhausted, or made foul by previous bad farming.

Corn is a crop which is now receiving more attention than heretofore. Cost of production per bushel:

1st. With manure, one acre—

16 loads; value, $1 each; one-half the value in the crop, and one-half remaining in the land	$8 00
Interest on land	2 00
Once ploughing	1 00
Marking	25
Planting	75
Cultivating and tending	1 00
Husking and cribbing	3 00
Cutting and shucking	75
Thrashing and marketing	2 00
	18 75
Value of stalks for food and manure	4 75
Yield per acre, 50 bushels.	50)14 00
Cost of raising one bushel	28 cts.

2d. Without manure—

Interest on land	$2 00
Once ploughing	1 00
Marking	25
Planting	75
Cultivating and tending	1 00
Cutting and shocking	75
Husking and cribbing	2 00
Thrashing and marketing	1 25
	9 00
Value of stalks	3 00
Yield per acre, 30 bushels.	30)6 00
Cost of raising one bushel	20 cts.

But if to this we add the additional expense attending the use and cultivation of the additional land (which is two-thirds) required to raise the 50 bushels of corn, the cost, without manure, is 31 cents per bushel, which will be found by adding two-thirds to the items for interest on land, planting, ploughing, marking, cultivating, and tending.

The average yield is from 30 to 50 bushels per acre.

I have been thus particular from the great discrepancy which I have noticed in the reports made to your department on this matter, varying from five cents to sixty-five cents per bushel on the cost of raising corn. The best system of corn culture is to manure the tillable part of the farm which has lain longest to meadow or pasture, and then plough, once in the spring, as soon as vegetation, and before the cut-worm has well started, turning under the manure well; and, if the land is high and dry, furrow out the ground across the furrows, three feet nine inches apart, with a small corn plough, and then, between the 5th and 10th of May, plant some, five kernels in a hill, two inches deep, some distance apart the other way; and, as soon as the corn is up in plain rows, keep the weeds and grass down and the ground mellow with the cultivator and corn plough through the season. If the ground be low I should plant on the tops of the furrows. The corn should be cut with the stalks, and shocked, as soon as it is ripe or glazed, in small shocks, and both corn and stalks secured as soon as dry. I am inclined to think that the best method of feeding corn is whole in the ear. For cattle the ears should be soaked, or boiled soft, over night. I have found but little, if any, benefit from plastering corn on the hill. It produces a rapid growth of stalks, but does not help the *corn*. I have applied plaster as soon as the rows could be followed, and also just before the time of earing. The result, in each case, has been without profit. Yellow dent is the best variety.

Oats are not a very profitable crop; they exhaust land. The only way in which we can afford to raise oats is to sow them upon highly manured land, after corn, near the barn-yards; and then turn over the stubble—once ploughing—in the fall, and sow to wheat; seeding the ground to clover in the succeeding spring. I have found this method profitable, as, without the oats, the land would have been idle through the season. Clover is the principal hay raised on the upland; yield, about one and a half ton per acre. Plaster is the best fertilizer for clover meadows and pastures. Clover is used to seed upland and Timothy lowland. About six quarts of seed are sown to the acre. It costs about three dollars and fifty cents per ton to raise clover hay. If clover hay is cut when not too ripe, and cured without too much exposure to the sun, and put in the barn without being wet, it is not injurious to horses; but as it is generally secured, it is.

Cattle are beginning to be more of an object with farmers here now. It costs from $12 to $20 to raise cattle three years old, as they are usually kept; and that is about their usual price at that age. Good dairy cows are worth about $15 in the fall, and from $20 to $25 in the spring. But the breed and quality of cattle, and all stock, are rapidly improving here, and the prices of such improved stock would range considerably higher.

You ask, will a given amount of food yield more meat in a Durham, Devon, or Hereford, than in a native animal? In answering this inquiry

I would remark that there is a great difference in native cattle. I have known some native cattle equal to any other breed of cattle I ever saw for fattening. I am not acquainted with the Hereford breed; it is between the Durham and Devon; I think the latter more hardy than the Durham, and would keep in better condition on the same feed, provided the care and feed were not very good. In the winter season, without good shelter, I think the same feed would yield more meat in a Devon than in a Durham.

A great portion of native cattle are far inferior to imported stock. But if proper selections were made from native stock, and the same care and feed afforded in rearing such selections as are given to the Durhams, I think a stock of cattle might be produced that would compare favorably with blooded stock. The Durhams, however, are superior to all other cattle in size and symmetry.

The best method of breaking steers to the yoke is to drive them around a yard moderately for an hour twice a day, two or three days in succession, before putting a yoke upon them. Then, after they become tame and gentle, as they will with such treatment, yoke them up and drive them with other oxen, and singly, being careful never to overload them.

Fruit.—I shall avail myself of information obtained from Mr. E. D. Loy, who has an extensive nursery in this county, in replying to this branch of your inquiries—citing his own language:

"'1st. Is the culture of fruit receiving increased attention?'"

"It is, particularly the apple, pear, and peach. None but the choicest varieties of fruit are cultivated to any great extent in this vicinity, and these are pronounced by good judges as being of the first quality. Cherries and quinces are not extensively cultivated, but flourish well on most soils and situations. Plums and nectarines are much injured by the curculio, and a fair crop is seldom raised. But some have succeeded by fumigating the trees with sulphur for three or four days, when the fruit was setting, about the time the blossom leaves the fruit."

"'2d. Cannot apples enough be grown on an acre to render the crop a profitable one to the farmer?'"

"There is, in my opinion, no crop so profitable to the farmer as the raising of the apple, for market, family use, and feeding." (In this I do not wholly agree with Mr. Loy.)

"'3d. Comparative value of apples and potatoes for feeding hogs and cattle.'"

"I am of the opinion that the apple is worth as much for feeding as the potato, particularly sweet apples."

"'4th. What varieties of the apple are best to keep for winter, and for exportation?'"

"Green Newtown Pippin, Baldwin, Esopus, Spitzenberg, Rhode Island Greening, Bellflower, Northern Spy, Swaar, Look-no-further, Roxbury, and English Russets, for exportation. And the above varieties, together with the Rambo and Talman Sweeting, are the most profitable for winter use."

"'5th. Do you know of any preventive or remedy for the 'blight' on pear, apple, and quince trees, or the 'yellows' on the peach trees?'"

"I know of no preventive for the above diseases, and no remedy better than cutting off the diseased branches and burning them. The 'yel-

lows' is a disease wholly unknown here; but the 'blight' we have in this vicinity to some extent.

"In transplanting trees, great care should be taken to make the soil rich, to plough the roots properly, and have the earth filled in about the roots well, and not leave any vacant places around and between the roots, and mulch them after planting with coarse manure. The best time for budding the apple, pear, cherry, and plum, is the 1st of August; the peach, apricot, and nectarine, the 20th of August.

"The best method of engrafting on small stocks, and in the root, is whip or tongue-grafting. For large stocks, and in the limb, cleft-grafting is preferable. In pruning trees, I consider the fore part of April and the middle of July preferable to any other time. In pruning, care should be used in not pruning too much at one time, as in pruning trees up, 5 feet is high enough to begin to form a head for a tree. An orchard should be cultivated with the plough and hoe, and manured often enough to keep the ground rich, and the manure should be applied over the whole surface of the ground."

There has been a very great improvement in farming in this county and State within the last five years, and there is now an increased and increasing attention given to the subject in all its branches. The importance of *ploughing well* is beginning to be appreciated. The importance of *keeping the soil clear from surface water* is obtaining a consideration. The importance of keeping *all grass and foul stuff from our growing grain crops* is more realized than formerly. The importance of keeping stock *sheltered in the winter by suitable sheds and yards* is being understood, and the profit of raising good stock is being felt. And I regret that the truth will not justify me in adding that the importance of *furnishing our youth with suitable agricultural instruction* is duly appreciated; but the future affords signs of promise in this regard.

This progress in the art of agriculture is owing, in part, to the influence of our agricultural societies, State and county, and in no small degree to the labors of your department of the government, in obtaining and disseminating useful knowledge on this subject. It would be well if a copy of your Patent Office Report could be furnished to each township and school district library in the Union.

Let us have remunerating prices for our produce—such as would be afforded if *our* products and raw material were more exclusively used by those who manufacture for us in our own, instead of in a foreign country; and the American farmer would furnish a stable and noble basis for the future prosperity and glory of our country.

Yours, respectfully,

GROVE SPENCER.

SOMERSET, HILLSDALE CO., MICH.,
December 7, 1852.

SIR: In answer to the *Circular* you favored me with, I deem it not out of place to offer a few preliminary remarks before proceeding to answer your inquiries pertaining to rural affairs.

The north line of this county is not far from 42° north, about equi-

distant from Lakes Erie and Michigan. In 1833 the county began to be settled, mostly by emigrants from Western New York; we may, therefore, be considered in a new country. The average settlement of farms in this vicinity will not range higher than 12 years; some few are 3 or 4 years older.

Almost the entire population are engaged in agricultural pursuits. The spirit of emulation and improvement is awakened among us. Rotation in crops is favorably spoken of.

The *drill*, *horse-reaper*, and *mower* are not yet introduced; too many stumps in the way yet.

Wheat and corn are our great staples. Such crops as flax, hops, barley, rye, broom-corn, tobacco, and most kinds of root crops, are not cultivated to any extent. Experience has shown that they may all be grown advantageously.

An agricultural society was organized in this county nearly two years ago. Two fairs have been held. At the last annual fair, in October, over four hundred tickets of membership were sold, and over one thousand admission tickets were disposed of. Not less than three hundred dollars were distributed as premiums.

Governor McClelland, of this State, delivered an appropriate address on the occasion. The exhibition would do credit to a county twenty years older.

We have been visited by an unprecedented drought this season—from about the middle of May to the 20th of June, we were without rain; summer fallowing had to be suspended. After two, or at most three days' ploughing, our fallows had again to be abandoned till the 20th day of September, when we had a splendid rain; and from that date to the present we have had a good supply of rain.

A great many wheat-fields have received but one ploughing, in consequence of the drought; and yet our present wheat crop looks decidedly better than the crop sown a year ago.

Wheat came in last harvest a full medium crop, of an excellent quality; but our corn crop, as far as my observation has extended, (over seven or eight townships,) has been a failure. Wheatland, Moscow, and Pittsford have had some good crops this season. Many fields in my vicinage, mine included, will not turn out more than ten bushels of ears per acre.

A wail went up the length and breadth of the State last spring, "that the seed corn was bad." Many planted the third, and even the fourth time; some at the last planting put 12 to 20 seeds in a hill. When the corn came up, many hills were *blank*, and the balance showed but one or two stalks in a hill. occasionally a hill would be represented with four stalks; and the drought nearly completed the work of destruction by preventing the crop from earing. This is the first year I have witnessed a failure in a corn crop since my location here in the spring of 1839. Those that were fortunate enough to have *old* seed corn had no difficulty.

The pioneers in this section have had "a hard row to hoe"—*smut*, rust, and sometimes a partial *failure* in the wheat crop; they have had to haul wheat 30 to 50 miles, and then get but 40 to 42 cents per bushel; they have had to sell their pork for $1 50 per cwt., and have had the country deluged with a worthless paper currency. These difficulties and evils

have mostly vanished; our State credit is good at home and abroad; rail and plank roads have sprung into existence as if by magic; and our surplus products can be transported wherever there is a demand.

The railroad from Toledo to Cleveland has just been opened, which gives us a continuous rail-route from Chicago to the Atlantic cities. The route will soon be completed as far as the Mississippi river; and buyers are already here for our fat sheep to be sent East on the new thoroughfare. A brighter era dawns upon us. Our turkeys and chickens may figure on a Christmas table in Gotham; our choice fruits may take a front seat on some of their fruit stalls; we hear the result of a general election, two thousand miles from home, by the time we have canvassed our own votes. We *realize*, now, what would have been called *visionary*, a few years ago, to dream of.

And now, sir, I will endeavor to confine myself to answering a few questions put forth in your Circular, as far as my observation and experience will warrant.

Wheat is our principal crop. Cash we must have, and the only reliable thing we have to get it is, (or has been,) to sow the Cereal. Our farmers are beginning to discover that constantly cultivating wheat on the same old farm is an up-hill business, if *summer fallowed;* getting a crop only once in two years, uses up a team. The furnace and blacksmith's bills are no small items in his expenses. If a farmer hires the work done, the crop will rarely leave a dime for his wallet after footing the bills. Necessity compels him to try his luck once more; his old fields must be skimmed again. Thus he is kept on the tread-mill platform for a few years, till the old farm is "hard up;" and ten to one if the "yellow fever" does not take him off—as far as the Sierra Nevada, at least. Thank God! a revolution is taking place in our farming system. Pork, sheep, dairying, together with clovering, are doing up the work of reform as effectually as could be desired. Instead of ploughing six or seven inches deep, as we were wont to do while our farms were new, many are setting the plough ten inches deep, and, by bringing the latent properties of the subsoil into action, our crops are increased.

No guano is used, and but few wheat-fields are manured with compost or any kind of manure. Plaster has been tried on a few fields with favorable results. Average product per acre this year, fifteen to twenty bushels; time of seeding, 10th to 25th September. This year's wheat, sown as late as the 10th October, looks finely. Time of harvesting, 10th to 20th July; preparation of seed, none except cleaning; quantity of seed; one bushel was formerly considered sufficient for new grounds; at present we use one and a half to two bushels. Wheat thrashed by machinery is often injured by being cracked; consequently, more seed is required.

I stated last year that, "if all wheat-growers here (in this State) would adopt the plan of sowing none but clean seed, and of the choicest varieties, for two years, the result would be, at the end of that time, an advance of ten per cent. on Michigan flour in the New York market."

Rotation in crops, no regular system.

How many times do you plough? For summer fallowing, twice; once in June, again in August or September, immediately before seeding; the depth of furrow varies from 6 to 10 inches. The model farmer, on old grounds, will gauge his plough at 10 inches, and "nothing shorter."

Hessian fly: Best remedy, sow after 20th September.
Weevils: None that I am aware of.
Average price: Of wheat, from 65 to 79 cents.

"What kinds of grass seeds do you sow with wheat?" I consider clover and Timothy the best for hay or pasturage; sow from four to five quarts of each kind on an acre, the latter part of March, or early in April, after the hard frosts of winter have *passed*. If a few inches of snow are on the ground, it will be in your favor; the seeds will, many of them, fall into the little fissures caused by the frosts of winter, and in an ordinary season will take root in a few days. It is not commonly practised to sow more than one third Timothy at the time of seeding; that will be sufficient to keep the clover from falling, and make better raking also. For a renovating crop, sow clover only.

Corn.—No guano is used. The average product per acre, for *good* lands, may be set down at 40 bushels. I prefer once ploughing, only, after the ground is *warm*—say from 15th to 20th May, and plant as soon as practicable. On old, smooth fields, the ground should be marked 3½ feet each way for the rows; on new grounds, with stumps, 4 feet will not give you any too much latitude. Plant 4 seeds in a hill.

Several varieties are in use here; I prefer the yellow dent and red cob. As soon as the corn is 4 inches high, start your shovel ploughs through it, two furrows in a row, each way; follow up with the hoe; no hilling will be necessary. In about 15 days, go through with the cultivator, same as with the plough, and the work is done.

I find by ploughing late, and planting from 20th to 25th May, that my corn will grow rapidly, and do as well with once hoeing as it will to plant in April and hoe twice. I have seen some fields of corn injured by ploughing when the crop was too large. Weeds ought to be subdued; but when you do it at the expense of your corn-crop, you "pay too dear for the whistle."

Oats are considered an exhausting crop; the average yield per acre may be put down at 33 bushels, although 40 bushels are not uncommon. This year the drought has left us but from 10 to 20 bushels per acre.

With but one fourth of a corn crop, and half an oat crop, our horses, cattle, and hogs will have a slender bill of fare this winter.

Hay.—The quantity cut per acre on our uplands (without plaster or manure) will not range higher than one or one and a quarter ton; on *low, moist* grounds, I have cut two tons per acre. This year, hay is scarce and dear; and although a great many cattle have been slaughtered, and a still greater number bought up by drovers, fodder will be in good demand.

Dairy Husbandry.—I am unable to say what amount of butter or cheese a cow will produce in a year. Cows in this section, from the first of May till September, pick their food on the range, and until the middle of July, they do as well, perhaps, as they would in a pasture; after that time the quantity of milk becomes less.

Butter at this time is worth 18 cents, and cheese 8 cents. The majority of farmers here keep from one to three cows. Dairying will eventually be a profitable branch of business when we get the *clover mania*.

Neat Cattle.—Cost of rearing till three years old, I think not far from $20. I sold good three-year-old steers this fall for about $17 per

head. Good cows in the spring are worth from $16 to $18, and in the fall about $4 less. Working oxen command a high price—those of a good stamp, $100.

Horses.—The growing of horses is profitable; the California movement has made a heavy draught on the horses of this State. Probably not less than 6,000 horses have left here for the gold mines this year. A pair of good farm horses is worth from $200 to $225.

Sheep and Wool.—Wool-growing is not only profitable, but it brings the dimes into an empty wallet just in time for harvesting.

I think that wheat and sheep husbandry ought to walk hand-in-hand. Sheep enrich our fields by feeding on them, and at the same time they subdue briars and noxious weeds, and, in an ordinary winter, may be kept on straw two-thirds of the time.

Sheep pelts at this time are worth (best quality) one dollar. Large sheep are best for mutton; buyers are governed by the size of the carcass. The proportion of lambs reared to the number of ewes is, I judge, not far from seventy-five per cent.

Potatoes.—Thank God! that scourge, the *rot*, has left our potato fields—at least, I have heard no complaint this year. The yield, owing to the drought, was light, but the crop was of an excellent quality. I harvested at the rate of one hundred and twelve bushels per acre; some premium crops ranged as high as one hundred and sixty, or upwards, at the county fair. My crop was planted on sandy loam, about the 20th May, in a corn-field; hills four feet apart, same as the corn; no manure; seed covered about three inches deep, making a broad hill, so as to retain the moisture; cultivated but once; hilled up about four inches, when I hoed them. I prefer but one hoeing for this crop. By hoeing often you are apt to create new sets every time you disturb the roots; if the ground is weedy cut or cover the weeds; but let once hilling suffice.

Varieties most in use here are the orange, or yellow, *Peach-blow*, *Pinkeye*, Merino, and *Meshannock*. The latter variety has been almost annihilated by the "rot." The Merino is a hardy root, and prolific; and from April till harvest it ranks the highest on our catalogue. It seems to be quite another thing from the New York Merino.

I think that large potatoes should be cut for planting. I prefer 6 or 7 bushels of seed for an acre in preference to twice that amount.

I recollect, when a boy of 12 years of age, a *lumberman*, in St. Lawrence county, New York, who economized in this way: Potatoes were scarce and dear; he wished to eat and plant out of his small stock; he took his knife and carefully cut each eye out, not much larger than a dime, and saved the residue for eating. In planting he found he had not seed enough to cover his ground; another resort was had to the knife; each eye was carefully divided into four parts; four pieces only were put in a hill. He harvested a good crop, as good from the latter as from the former cuttings.

Fruit.—Our soil and climate are capable of producing most of the varieties congenial to the northern temperate zone. Those who have taken the lead in orcharding are realizing handsome returns for their investments. A farmer near Jonesville, Mr. S. Gaige, told me, a short time ago, that he had sold nearly 1,000 bushels of apples for 37½ cents per bushel; the buyers picking the fruit. Mr. G. reserved the best orchard for himself. Beautiful specimens of fruit were exhibited at our county

fair this fall. We might almost challenge Pomona herself to beat them.

I have several varieties of choice plums in my garden. They are great bearers, being but five years from the bud. I measured one the other day; its circumference, 3 inches above the surface soil, was 12½ inches; (a Prince's Imperial Gage.)

The curculios have not disturbed any of my plums yet. I have some that have fruited 8 or 9 years. My practice is to mulch them every spring, and let the hens have free access to them during the season. Most kinds of fruit trees suffer by remaining on a sod, or meadow ground. The grass, if suffered, as is generally the case, to grow under the trees, will retard their growth materially. I find a valuable remedy by applying about three bushels of coal-dust (the bottom of a coal-pit, earth and coal mixed) around each tree. It operates like a charm wherever it is spread; it retains the moisture, smothers the grass, and makes the tree grow finely.

I tried last spring to propagate some choice fruit from cuttings; owing, as I believe, partially to the drought, I did not succeed very well. I intend to make another effort, and if successful I will report.

Preserving Fruit.—Take buckwheat chaff, and place alternately a layer of fruit and of chaff. The chaff is light. In case you wish to transport your fruit a great distance, it not only preserves from bruising, but is proof against frost, if used liberally.

Manures.—But little attention is paid to saving or applying manure; we are aware of its utility; we haul it to our fields if we find time; the low price of lands and the high price of labor will not warrant the operation in all cases. I will elucidate by stating a few facts relative to my own neighborhood, which will apply to many other portions of this State: Our school district embraces about three thousand acres of land; the majority of farms are eighty-acre lots; four lots, only, are unsettled; there are twenty-seven families in the district; three are mechanics, who follow their professions, and owning, together, ten acres of land; there are not more than six or eight boys in the district who are old enough to manage a team; five men have left the district for the gold diggings this season; four of them left farms to be managed as they best could be; the improvements on the farms will range from twenty-five to one hundred acres of arable land. There is but one man in the whole district who works at day's work, and he is accidentally here for a short time.

Marl is abundant if we had time to test its value. It is believed that the next generation will correct our errors.

If our farms were reduced to one half or one third their present size, we should begin to imitate Congress by laying an ad valorem duty on our barn yards, pig sties, hen roosts, privies, marl-beds, and swamps. These are generally within the reach of all our farmers. Our excuse for not doing it now is, that we have not time.

Price Current for Hillsdale, December 2, 1852.

Wheat, per bushel, 75 cents.
Pork, per cwt., $5 50 to $6.
Corn, per bushel, 44 cents.
Oats, per bushel, 38 cents.

Potatoes, per bushel, 44 cents.
Hay, per ton, $8.
Butter, per pound, 18 cents.
Lard, per pound, 10 cents.
Cheese, per pound, 8 cents.
Salt, per barrel, $2.

I cannot close my remarks without making a feeble effort in behalf of the farming community. If I rightly appreciate the feelings of the agriculturists of this great Republic, they feel as though their interests were overlooked, if not forgotten, at the Capitol. They want an efficient Bureau of Agriculture at Washington to give its *undivided attention* to rural affairs—to establish an Agricultural College, where experimental farming, in all its phases and bearings, shall be taught—the study of soils, manures, management, dairy husbandry, pomology, &c; where theory and practice shall go hand-in-hand; to distribute seeds of choice grains and plants, as well as useful information pertaining to agricultural pursuits, to the different State societies, and they, through some proper channel, to the farmers and planters. We ask but a pittance from the national treasury. If the bureau could have at its disposal an amount equal to raising and supporting a single regiment of mounted men in Utah or California for one year, or for a single ship of-the-line fitted out for the *Tongo Islands*, much good might be done.

I ought not to speak lightly of the navy; (I *almost* enlisted as a marine once.) The navy has been styled the "right arm of the nation." If you please, call the agriculturist the spinal column: cripple that column, and the right arm will be nerveless.

In the hour of need, on whom does our country rely to swell the ranks of war? Whenever the appeal has been made, has it been made in vain? Let the muster-rolls from Lexington to Chapultepec bear witness!

Millions of the United States revenue are expended in protecting our commerce. All right. The army and navy, and West Point to boot, are never overlooked, but come in for *all* the *glory* and full pay. All right, again. But how stands the case with the great mass?—five millions of farm laborers—who have caused civilization and science to tread close upon the retreating heel of the "red man"—who have made the wilderness to "bud and blossom as the rose"—have made the "solitary places become vocal"—who have performed the Herculean task of clearing up the vast expanse of forest from Maine to Texas, and from Florida to the great Northern lakes—who have covered this domain with fertile fields and thrifty hamlets—who have chequered it with roads and thoroughfares—have dotted its surface with school houses and churches—who have done more than all other classes united to make this "the land of the free and the home of the brave"—what has Congress done for them? Why, they have indirectly taxed them for more than two thirds of the revenue (am I correct?) and given them—what? The *Patent Office Report*—a work of real worth and utility, a treasure, indeed, to the farmer who is fortunate enough to *get* a copy. If the supply were equal to the demand, it would give greater satisfaction.

The halls of Congress are filled with legal and commercial men; but few farmers find a seat there: which, in some measure, accounts for their interests being overlooked.

As a class, however, we are willing to forget the past if we can but have the assurance that the prospects of the future shall not be dimmed by neglect.

We feel like swinging our caps and giving nine of our loudest cheers to the few choice spirits who assembled at Washington last summer and formed a National Agricultural Society. Their names are a guarantee that something will be done. It is to be hoped that they will carry the "war into Africa" with Congress, and press the subject home upon that body so strenuously that our interests will be duly considered.

The farmers and planters are unable to establish experimental schools that would have the desired effect. An institution of this kind should have an "odor of nationality about it."

It is argued by some that we have not suitable men to fill the various professorships. Shall we wait thirty years, as the empire State has, in the vain hope that something favorable will turn up? Will not the same fate await us?

In conclusion, I would suggest to the National Agricultural Society at Washington to sound the reveille in earnest, and the yeomanry of every State and Territory of this broad Republic will muster and stand ready to wheel into line at the tap of the drum. The farmers are ripe for action; all that is necessary is to "*go ahead*."

Respectfully, yours,

CHESTER HUNT.

To the COMMISSIONER OF PATENTS.

ANN ARBOR, WASHTENAW COUNTY, MICH.,
January 10, 1853.

SIR: The past season has been rather a singular one throughout this county, and, indeed, the whole peninsula. It has been a very good one for wheat—about the usual amount being raised, averaging 20 bushels per acre, remarkably good, perfectly free from rust or smut, and not molested by insects; bringing, at harvest, 65 cents per bushel; now, 94 cents in our city.

Corn was almost an entire failure, owing, in some measure, to a cold, wet time after planting, preventing its spreading. In most instances the farmers, after planting the second time and again failing, prepared the ground for wheat in the fall. Price of corn, 62 cents.

Oats have also proved a poor crop; price, 50 cents.

Barley.—Little used.

Rye.—None sown.

Peas and beans have done pretty well, and bear a good price; beans, $2 per bushel.

Hay.—Not so much as usual, and, owing to scarcity of coarse grain, would have been insufficient for the stock but for the remarkably open winter, enabling sheep, colts, and young cattle to get their entire living from the pastures and meadows. Price of hay the 1st of December $10; now, $8 per ton.

Butter and cheese have been unusually scarce; many dairy-men have turned their attention more to wool and wheat-growing. Cheese, 9 cents; butter, 16 cents.

Raising *neat cattle* is rather less than heretofore, owing, perhaps, to the high price of hay and grain, and to more profit in growing wool; still there is a gradual improvement in the breed, and a good many cattle fattened, beef bearing a good price.

The breeds of *horses* are also improving, and raising them is a great source of profit.

Growing of *sheep* and *wool* is, next to wheat, the greatest source of profit of our farmers, and is continually on the increase, although the high price of pelts and tallow induces the slaughter of a large number; pelts now being one dollar each; tallow, ten cents per pound. Rutabagas have been raised this season somewhat extensively, and are used to profit in fattening beef.

Potatoes have done remarkably well, but were not so extensively planted as they would have been but for the rot that has heretofore prevailed, of which we have not been troubled this year; cost of producing, about 20 cents; average price, 40 cents.

The culture of fruit is receiving increased attention, and is a source of great profit, particularly choice apples; a great many have been shipped to Wisconsin this season; price here, about 40 cents per bushel. Dried apples, $1 25 for 22 pounds. A great many of our California emigrants have returned this season; most of them have come to the conclusion that our soil produces as much gold, in proportion to the labor and expense, with more certainty, and far less exposure of health, than the mines of California: so, although the emigration to that country has not ceased, it is far less than last year. This has been a very good year for our farmers; every article of produce has borne a great price in cash; the season has been a very healthy one, and the weather has been so very fine that they have been constantly able to labor—preparing for and putting in crops, and harvesting and improving their lands; not enough rainy or other broken weather to induce them to go fishing or to frequent the tavern or stores; consequently, they have all got out of debt, and most of them have money to let.

I am, very respectfully, yours,

WILLIAM J. MAYNARD.

NORTHVILLE, WAYNE COUNTY, MICH.,
December 31, 1852.

SIR: I have received your Circular requesting information on the various branches of agriculture, and send you the following reply to such questions as are applicable to this vicinity:

Wheat is our most important crop. In this and the adjoining towns all other branches of farming are made subservient to it. The varieties chiefly cultivated here are the Blue-stem, Soule, and White flint. The Blue-stem is our favorite variety; it ripens early, and is not liable to rust; it has a plump, white berry, giving a large yield of very superior flour. The average yield of our crop this year is about 15 bushels. Time of sowing, from the 5th to the 25th of September. Time of harvesting, from the 5th to the 15th of July. The amount of seed sown to the acre is generally about one and a half bushel. In preparing fallow ground for

wheat, our best farmers plough but once, and then from 9 to 12 inches deep, afterwards using the cultivator or harrow to keep down the weeds.

Deep ploughing is beneficial, as it brings to the surface the subsoil, which in this section of the State contains all the materials necessary to promote the growth of the crop, and only needs exposing to the action of the atmosphere to fit it for that purpose. By this method of cultivation, the evil effects to the growing crop of excessive wet or dry weather may, to a great extent, be avoided. Our rotation in crops is—first, wheat on a clover lay; second, oats or corn; third, wheat; fourth, clover sown upon the wheat in the spring.

Corn.—Owing to the drought that prevailed here the past season, the average yield of our corn crop is at least 40 per cent. below that of last year. The most common varieties are the eight-rowed yellow and dent. The common method of feeding to hogs is in the ear; for cattle, it is generally ground with the cob. I am not able to state the cost of production per bushel, as that depends in a great measure on the yield. It costs but little more to cultivate an acre that will produce 40 bushels than one that will yield only 20.

Oats.—The crop this season is at least 50 per cent. below that of last year. It is an uncertain crop, and considered to be a great impoverisher of the soil. The quantity of seed sown to the acre is from two and a half to three bushels. *Barley* is raised to a limited extent; *rye* not at all.

Peas.—More are sown than formerly. They are less exhausting to the soil than any crop that we raise. Three bushels is the amount of seed sown to the acre. *Beans* are seldom cultivated as a field crop; enough is generally raised in the garden for family use.

The *Grasses.*—The quantity of hay cut from the acre the past season in this vicinity will not average over three quarters of a ton. The grass seeds preferred in laying down meadows are, clover and Timothy on our upland; Timothy and red top for bottom lands. The quantity of seed sown should not be less than 8 or 10 quarts to the acre.

Root Crops.—Turnips, carrots, and beets are raised by most farmers to a limited extent, principally for family consumption.

But little attention is paid to *dairy husbandry* in this vicinity, further than to supply our immediate wants. There is no doubt but that, by proper management, it might be made a profitable branch of business. Price of butter from 18 to 20 cents; cheese 10 cents per pound.

Neat Cattle.—A very decided improvement has been effected in our neat cattle by the introduction of a number of fine Durham bulls into this part of the State. By crossing that improved breed with our native stock, we obtain a grade of cattle that is valuable for the yoke, the dairy, or for beef. They are well adapted to our changeable climate, and consume the coarse feed usually given to our neat cattle with greater avidity, and more marked benefit, than our native cattle or the imported stock.

The cost of raising cattle until three years old is not far from sixteen dollars; the price at that age varies, according to the quality of the animal, from fifteen to thirty dollars. Price of good dairy cows in the spring, thirty dollars; in the fall, twenty.

Horses and Mules.—An increased interest is manifested by farmers in raising horses for service. First-rate horses find a ready sale, and at remunerating prices. Cost of raising colts until three years old, about

forty-five or fifty dollars; price at that age, from sixty to ninety dollars, according to quality. Mules are not raised.

Sheep and Wool.—Next to wheat, we consider wool-growing the most profitable business that farmers can engage in. The price that has been obtained for wool for the past two or three years, with the prospect of an increasing demand at remunerating prices, has induced farmers to engage more extensively in raising sheep. Some of our enterprising wool-growers have, within the last year, made importations from some of the most celebrated flocks in France. Such sheep are a valuable acquisition to our State, and will no doubt effect a decided improvement in our stock, which are already of a fine grade.

It is generally conceded that sheep with fine wool and long staple, as the French or Spanish Merino, are more profitable than the coarse-woolled variety. It costs no more to produce a pound of fine Merino than of coarse wool. The proportion of lambs annually raised to the number of ewes is about three to five.

Hogs are kept to a limited extent, for the purpose of consuming the slops and offal about the farm; but pork-raising for the market has not been considered profitable. The high price of pork may induce farmers to engage more extensively in that business. The best breeds are the Leicestershire, Byfield, and China, and their crosses. The cheapest method of producing pork is to keep the hogs in good clover pasture until fall, when they are put into small pens and fattened upon corn.

Potatoes have been less affected with the rot this season than any year since it made its appearance; fifty per cent. more raised this season than last. Price at the nearest market, fifty cents a bushel.

Fruit culture is receiving increased attention. Old orchards are being renovated and engrafted, and young ones of the best varieties—principally of winter fruit—set out in large numbers. An orchard bearing choice varieties of fall and winter fruit will pay a good interest on the investment; while poor fruit, like poor crops of any kind, seldom pay cost.

The apple-worm, which made its appearance in this part of the country two or three years since, has become very troublesome, and is justly exciting the alarm of fruit-growers. If it should increase its work of destruction in the ratio that it has since its first appearance here, our orchards in a few years will be entirely worthless. The Rhode Island Greening, Spitzenberg, and Red Canada are amongst our best varieties for winter use and exportation. Hogs thrive well on sweet apples, and for feeding horses they are considered an excellent substitute for grain.

Manures.—A great saving might be made in barn-yard manures by a judicious location of the buildings around which it is formed. Barns, as a general thing, are erected near some brook or pond, where cattle can have near access to water. The consequence is, the wash of the yard is carried directly into the water and lost. Such buildings should be so situated that the drainings of the yard may be carried as much as possible over lands that require manuring, and thus a great saving would be effected. Guano is not used to any extent; the high price at which it is held placing it beyond the reach of common farmers.

Plaster is used extensively on our meadow land and pastures, and is a top dressing for corn. Barn-yard manure is made use of in the production of our wheat and corn crops. It should be ploughed under as

soon as possible after being spread upon the land, to prevent waste by evaporation.

Swamp muck, which abounds in this State, is a most excellent fertilizer, especially when composted with other manures. I am satisfied, from actual experiments, that, when the fertilizing properties of this manure are generally understood, it will prove of great utility to our farming interests.

I have reason to believe that the Reports emanating from your Office are the means of conveying a vast amount of useful agricultural information to every part of our widely-extended country; and I shall feel highly gratified if the above is of any service to you in making out your Report.

Yours, respectfully,

J. D. YERKES.

KALAMAZOO, MICHIGAN, *January* 1, 1853.

SIR: In reply to your Circular of August, 1853, I would remark, that the drought of summer was severe, and materially affected the farming interest.

Wheat.—The berry was large, and the average weight was about sixty-five pounds per bushel; but the head was not more than two-thirds filled, making a small yield per acre; but the large quantity of land in wheat furnished a larger surplus than any previous year. The quantity of land seeded this past fall is not more than half as much as the previous year, owing to the severe drought—and this is applicable to the western part of this State; average price, 70 cents.

Corn.—The quantity planted was larger, but it came up badly—the seed not being sound—injured by frost of winter, as corn was gathered damp, being a wet season; which, with the summer drought, has caused quite a failure of the crops in this county—the yield not over one-quarter crop; and the price is higher than it has been for the past ten years, being 50 cents.

Oats were almost an entire failure, worth 40 cents.

Potatoes.—A very light yield, and worth 40 cents.

Hay.—Upland cut about one-half crop, and the wet land yielded heavy Upland hay is worth $10; marsh hay, $6.

Butter and Cheese.—The quantity made was a scanty supply; the price of the former 20 cents, and latter 10 cents—being higher than for many years

Hogs.—The number slaughtered was less than last year; price, from $5 to $6; the surplus has been sent to eastern markets; the quantity salted and held here is less than for a long time.

Wool.—The quantity was larger than before, fleeces heavier, andthe price from 30 to 45 cents.

Sheep.—The number is on the increase, and worth from $1 to $2. A good deal of attention is being paid to improving the stock.

Cattle have been in great demand for Eastern markets, and a great many have changed hands, making the stock less than for many years. The scarcity of hay and grain caused farmers to be a free seller at low prices.

Apples.—The supply was light, caused by late frost in the spring, and the drought made the fruit small, but better flavored.

Peaches very poor and scarce; plums and berries, also.

Very great attention has been paid to all kinds of fruit, and the best varieties have been introduced; the trees are generally small, just come into bearing; and a few years will furnish a great surplus of all kinds of excellent varieties.

Yours, respectfully,

WM. L. BOOTH.

To the COMMISSIONER OF PATENTS.

NEW CASTLE, HENRY COUNTY, IA.
December 27, 1852.

SIR: One of your "Agricultural Circulars" has fallen into my hands; I will endeavor to answer such questions as come under my particular observation.

Wheat.—There is no guano used in this county, and but very little manure of any kind in the cultivation of wheat. About fifteen bushels are the average yield per acre. Seeding is generally done in September; harvest is about the first of July. We generally sow wheat on oat stubble, plough but once, about five inches deep; the average price this year (say) 52 cents. Clover is sown upon wheat some time in March.

Corn.—Average product, about forty bushels per acre; cost of production, 10 cents per bushel. If clover sod, break it up during the winter; about the first of May harrow well and plant in rows about four feet distant each way. If stubble ground, break it up as near planting time as possible; harrow thoroughly and plant immediately. Corn is so cheap that it does not pay for grinding or cooking to feed.

Clover and Grasses.—Quantity of hay cut per acre, about two tons, no manures used upon meadows or pastures. Timothy is generally preferred for meadows; cost of growing, about $1 per ton. Do not know that clover is injurious to horses; but think Timothy or blue-grass preferable.

Cattle.—Cost of raising till three years old, $15; usual price, $20. Value of good cows in spring $20, in fall $15. The same amount of food will yield more meat in a Durham than in a native animal.

Horses and Mules.—The raising of these animals at this time is very profitable; cost of raising a colt until three years old, $30; average price at that age, $60. Blood mares should be provided with good pasture in summer and worked but very little; in winter should be stabled, have plenty of hay and a small allowance of grain.

Sheep and *Wool.*—Wool-growing is profitable; cost of growing coarse wool (of the Bakewell) about 12½ cents the pound; sells generally from 20 to 25 cents just as clipped from the sheep. A cross of the Bakewell and native will yield about four pounds to the head. Large sheep I think the most profitable for mutton or wool. I commonly raise as many lambs as I do ewes; but as a general thing, perhaps, three-fourths the number would be about right

Hogs.—The cheapest method of producing pork is feeding on corn. One hundred pounds of corn will yield about twelve pounds of meat. The best method of curing hams is "sugar curing."

Yours, respectfully,

ELISHA CLIFT.

CONNERSVILLE, FAYETTE COUNTY, IA.,
December 14, 1852.

SIR: Your Agricultural Circular of last August has been put into my hands to be answered. To reply to the several inquiries in regular order is out of the question. I can only give you, in a summary manner, the soil, mode of cultivation, and products of this and the adjoining counties.

The county of Fayette is situated on the White Water river, which runs through the centre of the county from north to south. The soil varies from the rich alluvial along the river and numerous creeks, through the various grades of upland, though by far the largest portions of the uplands are rich, composed of yellow loam mixed with a portion of fine sand. The county abounds in limestone, forming in places the beds of creeks, and constituting the foundation for a bed of soil. All the springs are limestone water. In a state of nature the land was covered with a dense forest, consisting, on the uplands, of the beech, sugar maple, ash, walnut, poplar, and oak; while the rich bottom lands abounded with the buckeye and sycamore, in addition to most of the former. The settlement of the county commenced in 1812. The advances made were slow, owing to the heavy forests and the inland location of the county, being nearly sixty miles from Cincinnati, the only market. The very low price of grain forbade its being marketed, and the only produce was flour, pork, and whiskey. For a long time none of these paid, and in this condition things remained until within a few years. The completion of the White Water canal opened a direct trade with Cincinnati, giving life and activity to the twin sisters, Commerce and Agriculture. Connersville is the county seat and the chief market point on the canal within the county.

The natural richness of the soil, improved by the mode of clearing, *i. e.* by first deadening the trees, and then frequently allowing them to decay upon the ground, has sustained a succession of croppings without much diminution until within a few years; and even now the chief improvement required is dressing with clover.

Hogs have been, and are still found to be, the most productive source of wealth to our farmers. The fattening of hogs by turning them from the clover fields into the standing corn in September and October, is a source of improvement of the lands. This mode of farming is now undergoing a change in the cultivation of sheep, horses, and cattle, thus lessening the amount of the product of the hog. The rearing of these, together with the wheat crops, forms a considerable item of trade in the county. Flour, though it does not pay well, is beneficial to the farmer in the rest given to land and in rendering the division of labor more equal.

Of *hogs* we have several varieties: the Polish, Irish Grazer, and the Chinese; though of the latter there are but few remaining. Indeed,

we have but few hogs of any one pure stock; they have been crossed and sub-crossed until the stock is *sui generis* peculiar to our place, and we are now breeding from the best specimens of the several crosses. The same may be said of our horses as to breed; though not elegant, they are well-formed, serviceable animals, and in demand in the market from $100 to $150.

Cattle are attracting more attention; the Durham Shorthorn and the Devonshire constitute the principal varieties, and, like the hogs and horses, have been crossed until the original is nearly lost. Cattle for beef are in demand, bringing from $20 to $50 each, depending upon size and condition.

Sheep are of a mixed variety, being descended from nearly all the kinds imported; more attention is being given to this branch of husbandry, which must become profitable, as much of our upland is well adapted to sheep-raising.

Poultry is beginning to claim attention, and a well-arranged poultry-yard occasionally adorns the farm.

Mode of Cultivation.—The mode mostly pursued is to alternate the crops of corn, wheat, and grass, clover for pasture, and Timothy for meadow. (Some few are using the blue-grass for pasture.) Clover is sown among wheat in early fall or spring; it does equally well sown with oats in the spring. Timothy is sown in the same manner as clover, and frequently mixed with it, and succeeds well both for meadow or pasture, though clear Timothy is regarded the best hay, particularly for horses. About the third year after seeding with clover, the ground is broken up in early spring, and planted in corn one or two years, and then goes the round of wheat, oats, &c., and again seeded in grass.

Subsoiling has, as yet, been but little practised; but will claim more attention, as it is believed that the ground stands the drought much better, and the soil yields a much better crop.

Wheat is sown by breaking up the ground and putting in the crop broadcast with the harrow. This is done in the last of August, and during September and October. By this mode it yields about eighteen bushels per acre. It is thought that, by a better mode of culture, and putting in with a drill, twenty-five bushels, or more, could be produced.

The present plan of cultivating *corn* is by breaking up the ground in the spring, and sometimes harrowing it; then crossing it off with a plough in rows three or four feet apart. This is done from the middle of April or May. It is then ploughed three or four times during the last of May or June; and the average yield is about sixty bushels per acre. Wheat at the mills, for the last three years, will average in price about 60 cents per bushel; worth now 65 cents. Corn is mostly fed to hogs and cattle.

Oats are only raised for a portion of the horse feed. *Rye* is little cultivated. *Hemp* and *tobacco* are very little grown, requiring too much labor. *Potatoes* are only cultivated for domestic use, being an uncertain crop. *Peas*, *beans*, and *root crops* are only cultivated for culinary use.

Barley is a prolific crop, yielding about fifty bushels per acre, and bids fair to be more extensively grown.

Fruit.—Apples are of an excellent quality, and are produced in large quantities. The peach, cherry, and plum are but little cultivated, owing to their frequent failure. The peach is injured by the winter and grub-worm; the plum by the curculio.

As yet, the object of the farmer in this and the neighboring counties is to obtain the largest profit from the smallest outlay of money and labor. The establishment of agricultural societies this year will doubtless do much for the farmer, and result in an improved mode of cultivation, and more accurate calculations in regard to the profit to be obtained by the application of science to what has long been considered a very simple occupation, involving no great amount either of skill or learning. Judging from the exhibitions at our agricultural fair this year, and the great interest manifested by all classes of our citizens, a competition is awakened, and an interest being gotten up, that will stimulate our farmers to become as intelligent and practical as they now are industrious.

The foregoing will explain the reason for my not entering more into detail. Farm-book sand details are superseded by the go-ahead-itiveness of our people.

It is hoped that from what has been said, something may be gleaned that will be found useful.

Respectfully,

JOHN SPIVEY.

CENTREVILLE, WAYNE COUNTY, INDIANA,
December 25, 1852.

SIR: I view the Reports from the Patent Office as exceedingly well calculated to disseminate a knowledge of the diversified pursuits of the citizens of the United States, and also of the products and manufactures in the various sections of our Union.

These yearly Reports will be read with interest and advantage by the mechanic, the stock-grower, and the farmer; they will have a place in our history, so that posterity can determine the manner and mode of our ploughing, harrowing, and harvesting. With these remarks, I will respond to your queries, as far as I feel myself qualified.

Wheat is sown from the 1st of September to the middle of October. Early sown is uniformly the surest crop. No preparation of seed, except freeing it from chess or cockle, is practised. In August or September the ground is well ploughed 5 or 6 inches deep; from one and a quarter to one and a half bushel of seed is then sown to the acre, and well harrowed, and the seeding is done. The wheat drill was last fall introduced into this county, and the young crop has a decided advantage in appearance over wheat harrowed or ploughed in. McCormick's reaper has been used by some of our farmers during the last harvest, and, though it has failed to given entire satisfaction, yet it is believed to be a great labor-saving improvement, especially in the large prairies of the West. The yield of wheat increases in proportion to the labor in preparing the ground for its reception. From fifteen to twenty-five bushels per acre may be relied on. To avoid the ravages of the Hessian fly, some sow early, while others sow late: both to produce the same result. When the fly attacks the young wheat in the fall, they are sure to prove themselves by their works in the spring. Late-sown wheat is more liable to rust than early, and that kind of wheat that ripens earliest is the surest crop. The weevil is not known here as a pest. Timothy is sown with wheat in the fall, and clover in February or March following. There is no

regular uniformity in relation to the rotation of crops, owing in part to the smallness of many farms. The usual practice in sward is to crop with corn two or three years, and alternately wheat, and then sow down with clover or Timothy, to be pastured or mown three or four years. Average price of wheat, 55 cents per 60 pounds.

Corn.—"This great stand-by of the farmers," when converted into pork, is almost the standard of value among us, and it has enabled many poor renters in a few years to become independent landlords. The Indian corn has been a powerful agent in the settlement of the Western wilderness, and the other crops may, and do occasionally fail. Corn has never, as a crop, failed.

The cheapness and simplicity of mills, with other methods of converting corn into meal, have done much in facilitating the rapid settlement of the new States.

The following anecdote from one of my neighbors, on his return from a hunting excursion, will fully show its valuable qualities in this respect: While out he sojourned with a pioneer, when they were edified by witnessing a novel mode of making corn-meal, which was simply performed by inserting a chisel through a fence-rail in the form of a plane bit, and the operator with an ear of corn quickly passing it over the edge of the chisel. Although something like meal, and tolerable bread, was thus produced, and the host and myself partook of it without making any apology, yet their travelling friend had no exalted opinion of the invention.

In preparing our ground for corn, we plough as early as the land is sufficiently dry; if cloddy or sward, it is harrowed; it is then crossed with a light plough, three and a half or four feet both ways, and at every intersection from three to five grains are dropped, and the covering performed with a hoe. If the cut-worm is anticipated, the number of grains to a hill is increased. Four stalks to a hill are considered the most profitable in the yield of a corn crop.

The mode of culture is various. The old shovel-plough is mostly used, while some farmers use, during the tilling season, the cultivator. The two-horse harrow, in the form of the letter A, with the front tooth out, is much used when the corn is quite small. The three-shovel-plough is fast coming into use; and as the stumps and trees are becoming rotten and out of the way, they will be generally introduced.

The yield of corn per acre depends much on the quality of the soil; the average yield in this county per acre may be placed at thirty-five bushels, while from fifty to seventy five bushels are frequently gathered. The cost of raising is estimated at 11 cents per bushel. It is fed whole to our stock.

Oats.—Two bushels of seed are sown to the acre; average yield per acre, from twenty-five to thirty five bushels. This grain is considered a hard feeder on the soil. Here its cultivation is neglected by many farmers. In yield, barley and oats are alike, though the former is considered less hurtful to the soil. Rye is not sown with us, and peas and beans only for family use.

Clover and *Grasses.*—We cut from three-fourths to two tons of hay per acre, and the cost of making it is $2 60 per ton. Timothy hay is preferred, and finds the readiest market. Red clover hay, when well cured, is not considered injurious to horses, and a mixture in the meadow

of clover and Timothy makes the richest hay. The first crop of clover produces no salivation. From four to six quarts of seed are sown per acre.

Neat Cattle.—The cost of rearing until three years old is about $18, and the usual price at that age is from $18 to $22. Good milch cows are worth in the spring $20 and $22, and good fresh cows in the fall are worth $25 and $30. I know of no positive trial of the relative properties of the improved and native stock. In yielding good beef for a given amount of food, I feel confident that the Durhams are the most profitable breed for feeding. If in rearing cattle the same care was exercised to avoid in breeding and selecting a bull as is generally taken in selecting a stallion, effects would certainly follow calculated to please the eye and the pocket.

Horses and *Mules*.—The cost of keeping a colt until it is three years old is about $45, and the rearing of them is now a profitable business. But few mules are raised in this county or district; hence, further remarks will be unnecessary.

Sheep.—The rearing of sheep is not considered a money-making business; consequently, farmers keep a number sufficient for domestic uses. Large sheep are preferred, and the proportion of lambs annually reared to the number of ewes is over two-thirds.

Hogs.—The breed most esteemed is a cross of the Russia and China; and this stock crossed with the Grazer is preferred by many. In regard to the question—how many pounds of meat one hundred pounds of corn will make—it has been well tested that twenty-five bushels of corn will, with three months' pasture of clover, make two hundred and fifty pounds of pork. Taking fifty-six pounds as the standard of a bushel of corn, we have eighteen pounds of pork for one hundred pounds of corn. Others say (equally entitled to credit) that twenty-seven bushels of corn will, after pasture, make three hundred pounds of pork, or nineteen and three fourths pounds per hundred pounds of corn. Root crops are only grown as family vegetables. Irish potatoes are better when grown on new land than on old, and are more liable to have the rot on manured land than otherwise. Increased attention is now paid to the cultivation of the sweet potato, with cheering practical results. Neither guano nor plaster has found its way to the district; nor has the use of lime thus far been successful, or met with encouragement.

Respectfully, &c.,

A. HOOVER.

To the Commissioner of Patents.

Williamsport, Warren County, Indiana,
December 1, 1852.

Sir: Two years since, I had the honor of submitting to the Commissioner of Patents a report of the condition of agriculture in this county. The chief changes wrought in the interval are, the reclamation of additional portions of prairie; the abandonment, by the prairie portions of the county, of the production of wheat; and the introduction into our meadows of grass-cutting machines. The immediate effect of the first

will be an extended production of pork and beef, as the newly-broken prairie is too remote from market to allow of marketing corn.

The relinquishment, by the prairie, of the culture of wheat, limits its production to the timbered portions of the county, which have a clay soil, and to the barrens or oak openings, which are mainly sand underlaid by clay. This, together with the better style of putting in wheat, where it continues to be grown, has had the effect of lifting the average acreable product to about fifteen bushels. Seeding for wheat continues from the 25th of August to the middle of October; the late seeding occurring chiefly among those who sow ground from which corn has been cut to shock. If clover sod or stubble is to be turned, one ploughing to the depth of four or six inches is followed by one or two harrowings, during which one and a quarter to two bushels of wheat are seeded in. If the crop be put in among corn, the whole operation is done at one ploughing with the shovel-plough. In March, clover, or clover and Timothy, are sown if the ground is intended to be brought into grass. From the 1st to the 15th of July the crop is harvested, and it brings, on an average, about 55 cents per bushel. Wheat is a poorly remunerating crop, owing to the high price of labor and the inability to use reapers in fields not yet clear of stumps.

Corn is the staple crop of this region, and much diversity of opinion prevails as to the most eligible mode of managing it; many supposing a system of culture good which the fertility of the soil has insured against failure. The most uniformity obtains in the manner of putting in a sod crop. Prairie sod is turned in the latter part of May or early part of June; because the grass, once started, is more easily killed, and the sun is then strong enough to do that office for it. The sod is aimed to be cut at the depth of two inches only, as a greater depth would make the grass liable to grow again. The furrow-slice is from twenty to twenty-four inches, and is laid as smoothly as possible, to prevent the grass from peering up through the seams. A man then passes along every second seam, and with an axe, or similar instrument, makes a hole at intervals of three feet, into which he drops three or four grains of corn, covering them with a brush of the foot. No cultivation follows, and the crop yields according to season, from fifteen to forty-five bushels; with a preference for the lower rate. Being put in late, it is oftener caught by the fall frosts; and the number of nubbins is greater than the ordinary crop. The next year the ground is as mellow as an ash-heap; and few weeds having established themselves, it is no great feat, during two succeeding years, for a hand to tend thirty acres of corn; raising in a favorable season twelve hundred bushels of corn. There is a mode of cultivating corn which is called *listing*, and is approved by some of our shrewdest farmers. It is applicable only to stubble-ground and that tended in corn the previous season. The most common way of executing this is by passing along with a plough and throwing up a furrow, and returning, so as to throw up another against it. The corn is then planted on the top of the ridge; the ridges are formed the distance apart that the corn rows are intended to grow. After planting, the intervening spaces are broken up. As will be perceived, there is a ridge of hard ground immediately under the corn rows; this is partially broken in the cross-ploughings given while tending the corn; but as a shovel plough is a poor instrument for breaking ground, it cannot be as effectually done as

if broken in grass previously to planting. Besides, it devolves upon one horse the work of two; and withal leaves a hard patch immediately below the hill.

Another mode of listing is to throw up a furrow and return in such a manner as to throw back the ground into its original position. The remaining treatment is as in the other case. This saves less in a point of time. The advantage of listing is that it enables a man to put in more ground than in the ordinary way; and as most men can tend more corn than they can put in, this is considered a gain. Hence, too, if delayed by sickness or unfavorable weather, a farmer may recover some time by listing his field, instead of breaking it up entirely before planting. Those who advocate the listing practice are generally energetic men, having new ground. In the hands of a slow man, the plan is likely to succeed poorly. The usual distance apart for corn rows is from three feet to three feet eight inches. Many who have a fresh, strong soil, prefer to plant considerably closer, putting fewer stalks in a hill. Certain it is, that, to have a large yield, there must be an abundance of stalks on the ground.

The quantity of grass cut per acre is one and a quarter ton, on the average. About $2 a ton may be set down as the cost of making hay. This will include the rent of land, and be subject to an abatement of 25 cents an acre for the value of fall pasture. A reduction of full one-half the actual outlay will be effected by the introduction of mowing machines. One of Ketchum's, in use here, cuts twelve acres per day, requiring one hand and two pair of horses, each being used half a day. Their earnings, at present rates of mowing, would be $9 per day. Meadows in this county are not manured.

It costs $12 to rear a *steer* till he is three years old, when he will be worth about $18. Good milch cows are worth $15 in the spring, and $12 in the fall.

In this county, where land and corn are cheap, and labor high, as cheap a mode of producing pork as could be pursued would be as follows: Have your pigs come in April, or as soon thereafter as possible. Let the sows have the range of the clover field, and corn enough to keep them in condition while suckling. Feed the weaned pigs some corn to keep them growing; young pigs do not thrive well on clover alone; they must be wintered, too, on corn. The next season, if they have been kept thriving through the winter, they will continue to do so during spring on clover alone. Take them off before it goes to seed; else they will slobber. Have a field of ripe oats or rye for them to run on when called off the clover; it should keep them a month, by which time corn will be in roasting-ear; cut up and feed them what they will eat; they will eat the ear and much of the stalk, and the balance they will chew, so as to extract its juice. As much is realized from corn at this as at any subsequent time. When corn is hard in September, have a field to turn them on. In dry weather the waste will not pay for the gathering, and of this your stock hogs, turned in afterward, will save much In wet weather the plan cannot be followed; that which is trampled in the ground will spoil. The corn must, therefore, be gathered and fed while the ground remains soft. This, however, is not generally done; once turned on, they are suffered to remain. When the hogs have gathered the fields they should be penned near running

water, and fed what corn they will eat. They will come into an early market weighing 250 pounds and upwards. This plan is adapted to raising hogs in large lots where access to market is difficult; I know of no one who has pursued the plan throughout. It needs a large farm and the combination of soil which will raise clover, oats, and corn; but its several features are highly approved of and practised upon by some of our most ju ticious farmers. The oat-field, after being cropped by the hogs, has all the straw on it ready to turn under for wheat; and in a country where manuring is not practised, it is easy to perceive that the corn field is left in a better condition for a future crop than if the corn had been gathered and fed.

Respectfully,

C. B. BOYER.

To the COMMISSIONER OF PATENTS.

BEECH GROVE, RUSH COUNTY, INDIANA,
December 6, 1852.

SIR: Your Circular of August, 1852, has just come to hand, and for fear that others more competent will neglect it, I will attempt, though perhaps but vaguely, to reply to some of the questions propounded. But before proceeding further, I desire to notice one thing in the Circular. You say that the United States Census will furnish reliable data as to the quantity of grain and other crops. It is true that the Census returns of 1850 show the quantity of wheat raised in Indiana in 1849; but that was a most disastrous year for the wheat-growers of this State, the wheat being universally struck with rust. Thousands of acres of wheat were not cut, and much that was never paid for harvesting and thrashing. Now, I am clearly of opinion that by taking the wheat crop of Indiana as shown by the Census returns and doubling it, you would have a close approximation to the average of the three crops raised since that year. This much I deemed it my duty to say, to place Indiana in her true position as a great wheat-producing State, while at the same time disclaiming anything like censure: so far from it, indeed, that I heartily approve the course adopted. Statistics never can be made reliable or useful until the States adopt a system for collecting them officially. Then their embodiment in one general report would lead to highly valuable and useful results, as *facts* for farmers will be better than *guesses* at their products.

Perhaps I could give you a better idea of our manner of farming by going back to primitive times in this country; and in so doing, I shall not confine myself strictly to your questions in their proper order.

The southeastern portion of Indiana was originally one vast, dense, heavily-timbered forest, and the plan pursued in clearing was to girdle the trees in the months of May, June, or August, and from four to six years after, in a dry time, to enter such a *deadening* with fire and burn the timber off. On such land, three, four, or even more crops of corn, are first raised, and then wheat sown with the corn—sometimes at the last ploughing in July; sometimes in August; but generally wheat is

sown in September. From February till April following, clover, or clover and grass seed, are sown on the wheat, and, if sown early, afford abundance of pasture after harvest—more than will pay for the seed and the labor of putting it on. The next year, hogs are turned where clover alone has been sown, and cattle and other stock where a mixture of seed has been used. Late in the fall, or during an open spell in the winter, or early in the spring, the clover sod is turned under from five to seven or eight inches, and when the time for planting arrives, the sod is well harrowed, crossed off both ways from three and a half to four feet, and three stalks allowed to each hill; when thinned, sometimes three and four, alternately, are allowed to the hill. The first thing used in the corn crop by many farmers is a two-horse harrow, with some of the middle teeth out, so as to pass over a row without injury. The implements chiefly used in the after-culture are the one-horse harrow, cultivator, shovel-plough, and hand hoe. Wheat and clover again follow corn; clover is frequently allowed to stand two years, and clover and grass three or four when the ground requires rest.

Where wheat is sown (as it sometimes is) on clover sod and oat stubble, one ploughing is almost the invariable rule. Wheat sown on clover sod generally makes a large yield if it does not fall before it fills; and if it falls afterwards, the expense of harvesting such a crop, with the present extravagant prices of harvest labor, makes a serious inroad on the farmer's profits.

We are too far in the interior to justify the hope that guano or plaster can soon be obtained here, at prices that would encourge their use, even on a small scale. The nearest lime kilns are twelve or fifteen miles from where I now write; price of lime at the kiln, 20 cents per bushel, and difficult to obtain in sufficient quantities for building purposes. Our soil abounds in lime, and, until it is more exhausted by cropping, it will not be likely to be used except by way of experiment.

Wheat is generally harvested here between the 25th of June and 5th of July; this year, from the 5th to the 15th of July. Having no means of ascertaining the average of wheat per acre in this county, I will just say that for ten years past my crops have averaged over twenty bushels. Few persons use any preparation for seed wheat. The quantity of seed used per acre is one to one and a half bushel.

A prosperous agricultural society, aided by Patent Office Reports, agricultural books and papers, more generally diffused among our farmers, is waking them to a spirit of improvement. We are getting better stock and better farming implements; and with better implements, we can till the ground better, and receive, as a reward, an increase of crops. I think we are safe in saying that all our leading crops are on the increase.

The best remedy for the Hessian flies is to sow wheat on land rich enough to produce a rapid luxuriant growth. There is then much less chance for them to eat it, so as to destroy the crop. Weevils are little known here.

Rushville is our nearest market for wheat; fifty cents the uniform price for eighteen months past.

I have repeatedly kept accurate accounts of the cost of wheat crops, and find that fifteen bushels per acre, at 50 cents per bushel, leave a very small margin for profit; whilst thirty bushels upon an acre will leave $6.

Let us state the account thus:

30 bushels wheat, at 50 cents per bushel	$15 00
Cost of production on *one* acre	9 00
Net profit	6 00

30 bushels wheat, at 50 cents per bushel	15 00
Cost of production on *two* acres	15 00
Profit	

Corn.—Taking a series of years, the average yield of corn per acre would not vary much from fifty bushels. Last year it probably run as high as seventy bushels; this year, owing to the severe and long-protracted drought when corn was earing, it scarcely reached forty bushels. With the present high prices of land and labor, corn cannot be produced much below 20 cents per bushel; the present price, however, is from 30 to 35 cents, owing to the shortness of the crop.

Best method of feeding: Until labor becomes cheaper and more easily attainable, and our facilities for grinding grain greater than at present, it appears to me impracticable to bring into general use any other method of feeding corn than our present one of feeding it whole. Thousands of acres of corn are annually *hogged down*, as we term it here; that is, the hogs are turned into the standing corn and allowed to gather for themselves. And here I must remark that a field of corn hogged down early, and then broken up and sown in wheat, almost invariably produces an extra crop.

Oats, Barley, Rye, &c.—Oats are a sure crop with us, and yield from forty to fifty bushels per acre. From one and a half to two bushels are sown per acre. They are usually sown where corn grew the preceding year, and, if not laid down to grass for pasture or meadow, are frequently hogged down, and followed with a wheat crop, and in that case are not very exhausting; but, when harvested and taken off the ground, they are. Rye is thought to be a less certain and less profitable crop than wheat, and when sown it is always done at the last ploughing of corn. Its greatest value is for the pasture it affords for calves and colts during the winter and spring. With the exception of what little is harvested for seed, it is always hogged down, and rather improves the soil than otherwise. It generally fills best when close pastured. Barley is beginning to be raised by our farmers, and, so far, appears to yield well and pay well.

Beans are raised by very few farmers as a field crop, but pay at present prices—from $1 to $1 25 per bushel.

Peas are not raised at all as a field crop.

Clover and *Grasses.*—The quantity of hay cut may be set down at from one and a half to two and a half tons per acre. No fertilizers used. Timothy is the favorite grass for meadows; clover is often mixed with Timothy, and increases the yield; and the only real objection to such mixture is the difference in their time of ripening. For pastures, blue

grass, Timothy, red top, orchard grass, and clover, are used; and white clover crowds itself into the list, whether sown or not.

I have not found *good* clover hay injurious to horses when fed out of a manger, but when fed out of racks there is some danger of its injuring their eyes. Clover sown in the spring affords good pasture for horses after harvest, and the next season until harvest; after that it is apt to salivate them, more especially if the weather be showery. Most farmers, however, prefer the other grasses named to clover for pasture r horses.

Dairy Husbandry.—There is but one dairy farm in our county where b usiness is carried on systematically to any extent, although we have an abundant supply of the richest pasture-lands, inviting others to engage in the same pursuit.

Neat Cattle.—The cost of rearing until three years old, I would estimate at from $12 to $15. This may seem low, but, when we take into consideration the fact that we keep our cattle mostly on that which otherwise would be entirely wasted, it is perhaps high enough; cattle are wintered here thus: All the corn not hogged down or cut up is husked on the stalk in the field, and the pasture of such fields keeps cattle in pretty good condition; and the fodder of corn cut at the right time is better than any hay for cattle. Our farmers all get out their wheat with machines, and at the time of thrashing rick up their straw in such a way as to afford comfortable shelter for their cattle as well as food; and by the use of salt, cattle can soon be taught to eat straw with avidity. Thus we manage to keep a good many cattle without the expense of making meadows and saving hay.

Steers at three years old are now worth from $18 to $25; cows from $12 to $20. Steers when stall fed are generally fed on shock corn, and the droppings of fifty steers thus fed will keep from fifty to one hundred hogs, according to their size and age.

Horses and *Mules.*—Is the growing of these animals profitable? At prices obtained for three or four years past it is a good business. Horse colts are now worth at weaning time from $20 to $35. Mule colts at the same age sell for from $25 to $40. Good horses for the saddle or draught bring from $75 to $120. Mules are mostly sold and driven to the South before they are old enough to work.

Sheep Husbandry.—"Is wool-growing profitable?"

On cheap, hilly, broken land, adapted to grazing, and not to tillage, there are inducements to engage in sheep raising. But here, where land is worth from $25 to $35 per acre, and almost every foot of it susceptible of being brought into the highest state of cultivation; when hogs are worth from $3 50 to $4 per hundred gross, and cattle $2 50 per hundred gross; and horses and mules as already stated; it appears to me our farmers would not act wisely to abandon their present pursuits, and go exclusively into wool-growing. Most farmers raise wool enough for their own use, and, where help is abundant, it is worked up in the family; if not, it is taken to the factories in the vicinity, and the owner pays for working it up, in wool or money, as best suits his convenience. Very ittle wool is exported, except what goes on the backs of the sheep to the Cincinnati market.

"How much more does it cost to raise a pound of fine Merino wool

than of the ordinary kind?" I am unable to say; but am satisfied the difference in the cost of production is much less (if anything) than the difference in price. I have, in the course of my life, had some experience in raising both kinds on a small scale, and would prefer raising fine wool at less difference in price than is generally obtained.

I would like to see an experiment something like this tried: Let twenty good Merino sheep be taken, and their live weight ascertained; then take ten large coarse-woolled sheep whose weight shall be equal to that of the twenty Merinos. Let them be wintered separately, and the food consumed by each lot accurately ascertained; and I incline to the opinion that there would be but little difference. At shearing-time, let the clip off each lot be weighed; and again I think there would be but little difference; and if so, raising fine wool must be most profitable. Could not some one who has both kinds, and opportunity to do so, be induced to try some such experiment for the sake of the cause of agriculture? If I am wrong, I would like to know it; and thousands besides might be benefited by such an experiment.

Hogs.—"What the best breed?" We have Russian, Polish, Grazers, Big China, Berkshire, and other breeds; but I apprehend but few hogs of pure blood, of any breed, could be found in this county. All the different breeds are crossed to an almost unlimited extent, and I would not even hazard an opinion as to what breed or cross was most popular or most deserving of popularity.

Where labor is so scarce as often not to be had for love or money, the following is believed to be the cheapest method of making pork, and is generally adopted: Pigs that come through the season are fed through the winter on corn in the ear, and about the first of May are turned on clover. If rye and oats are raised for them they are turned into a rye field when the grain is in the dough state. From thence they go on oats, and, if the corn be ripe enough, they go into a corn field when the oats are done; if not they are fed with old corn, or turned again on clover. Those who do not raise rye and oats allow their hogs to remain on the clover till new corn comes in, unless they have old corn to begin to feed with a few weeks earlier. If corn be gathered and fed to hogs, they should always be fed on a clover-field designed for corn the next year, and the manure and clover turned under soon after the hogs are taken off. Thus the crop of corn taken from one field may be made to reproduce itself the next year on another. This is believed to be the cheapest method of raising pork. It requires less labor, and is less exhausting to the soil; nothing being taken from it but the live weight of the hogs driven to market.

"How much pork will one hundred pounds of corn yield?" This question, or questions of similar import, have so often been answered in former Reports, and the answers are so generally below my estimates, that I shall not fly in the face of so much authority by venturing an opinion.

No pork or bacon is put up here except for domestic use. Our hogs all go on foot to the Cincinnati market. Pork is our great staple. From thirty thousand to fifty thousand hogs, averaging two hundred and fifty pounds gross, are anually driven to market, besides what are kept for home consumption; and all this we do with a population of less than seventeen thousand souls on a territory of four hundred square miles.

Next in value and importance in our list of exports is wheat; and next, horses, mules, cattle, and sheep; whilst oats, barley, flax-seed, beans, poultry, feathers, eggs, butter, &c., furnish no inconsiderable item.

Hemp and *Tobacco.*—Our soil and climate are well adapted to the culture of these crops; but, for reasons unknown to me, few of our farmers have ever engaged in the cultivation of either, though there is no doubt but they would be remunerating crops.

Root crops are not cultivated here as field-crops, and probably will not be soon. Our country is generally, but gently, undulating, and there are many locations where cellars would fill with water, or, at least, be too damp in winter to keep roots; and to bury them in heaps and have to dig them out of frozen ground, under the snow, would not suit the taste exactly of a go-a-head Hoosier. Yet no country would produce roots in greater perfection if the people could be made to believe there was more money in them than in anything else.

Potates, Irish.—"Best method of planting." When we were clearing land, as already described, there was no difficulty in raising any quantity of potatoes. If well put in they yielded abundantly, with very little after-culture. I have raised at the rate of four hundred bushels per acre with very little labor. New land is still used by those who can do it, and those that cannot plant on old sod land, or on some lot where hogs or other stock have been fed. Any of our land will produce good potatoes by the application of a little long manure. The potato-bug is becoming an enemy scarcely less formidable to the potato than the rot. Since the appearance of the potato disease, although it has never been so bad here as elsewhere, I am inclined to think that, even when not attacked by the disease, the yield is less, and the quality of the potato inferior to what it formerly was.

Fruit Culture.—"Is the culture of fruit receiving increased attention?" Cannot say that it is. Much pains have been taken from the first settlement of the country to procure good fruit, and now few counties can show finer apples or a better selection of varieties. The *curculio* destroys the plums. The *yellows*, with the severity of the past winter, has nearly finished the peach trees, and the *blight* the pear trees: so we may well be proud of our fine apples, for they are almost the only fruit we have left to boast of, except some of the hardy varieties of the cherry. Apples enough can be grown on an acre to be profitable to the farmer if he makes no other use of them than to feed to stock. They are more nutritious, and less expensive, than root crops. The Newtown Pippin and Jenneting [?] are among our best varieties for long keeping, and, with proper care, may be kept sound until the earlier kinds begin to ripen. I know of no preventive or remedy for blight in pear trees or the yellows on peach trees, but would hail such a discovery as among the greatest in this age of wonders. Unless some preventive or remedy is soon found we may as well abandon the cultivation of the pear and peach in this region.

Transplanting, Budding, &c.—Having already extended this article beyond reasonable limits, I should have closed here but for the fact that some things have appeared in Patent Office Reports heretofore, as well as in horticultural works and agricultural papers, calculated to mislead the new beginner in the West. Manuring at the time of transplanting and ploughing, manuring and stimulating, and forcing the growth of trees

afterwards, are all well enough in the strong hill-sides of New England, and on the sandy plains further south; but in the West the man that pursues such a course does it at the imminent danger of losing his orchard by winter-killing. I know this to be true, for I have tried it on one orchard and lost thirty out of one hundred as fine apple trees as I ever looked at, in one winter, by being winter killed; and thousands besides have tried like experiments with the same disastrous results. With us the question is not how shall we make our trees grow faster, but how shall we keep them in a healthy condition without letting them grow too fast. After an orchard is set out, crops that require cultivation may be grown on it with safety for four or five years; after that it should be kept in clover, and, if the clover dies out, it should be ploughed and harrowed in the fall after the trees are done growing, and clover again sown in February or March following. If it becomes indispensable to cultivate an orchard to extirpate foul weeds, it should always be done when the trees are well loaded with fruit; then all the energy of the tree is directed to the maturing of the fruit, and there is no danger of an inordinate fall growth or winter-killing. When an orchard is ploughed and the ground put in good order in the fall, it induces an early vigorous growth of the trees the next season; and if the trees make a large early growth, they make a small late one; and *vice versa*. If an orchard is ploughed in the spring and cultivated in some crop till harvest, the mutilation of the fibrous roots and spongioles retards the early growth of the trees, and induces an extraordinary late growth, placing the trees in the best possible condition to be killed; provided the fall and winter favor such a result. I often use the phrase "winter-killed;" yet I do not like it, because we never experience a degree of cold here that would affect trees injuriously if the growth of wood was completely matured before cold weather. Judging the future from the past, on the 27th of October, 1851, I wrote down a prediction that there would be a great destruction of fruit trees the ensuing winter, and never was evil prophecy more literally fulfilled. The early part of the season had been rather unpropitious to a rapid early growth; August was very dry, and retarded the commencement of the late growth; and September and October, being warm and showery, stimulated the trees to a very vigorous late growth. On the 26th of October a very rapid fall in the thermometer occurred, and with the leaves on the trees as green as at midsummer, a very heavy frost came on and completely destroyed their vitality; and the moment that happened, that wonderful chemical laboratory that had been converting sap into woody fibre, ceased its operations as suddenly as a steam engine when the boiler bursts. Every pore of the wood was filled to repletion with a watery fluid, that the tree was powerless either to throw off or assimilate. The sap became vitiated, and, on making an incision in the bark late in the fall, a colored, watery fluid, sometimes slightly acid, exuded. It is a well known law of nature that all fluids expand by freezing; and in obedience to this law the trees surcharged with watery fluid expand until the bark bursts, and on the return of mild weather the water escapes at the cleft made in the bark, the tree again contracts to its natural size, the bark sometimes standing off the fourth of an inch from the wood, the winds of spring dry the bark in that position, and the trees perish. When trees are in such a condition I doubt whether any of our winters are so

mild as not to kill them. Our mildest winters freeze to their centres trees larger than any of our fruit trees. Now, I will not say that the causes alluded to bring on the real blight; but acid, diseased sap, induces an unhealthy condition of the tree, and brings on diseases that often pass under that name.

I have now an orchard of one hundred and forty apple trees set out fifteen years ago, and although I have occasionally had a tree slightly injured, I know of no orchard that has come off better, and thousands have fared far worse. And the loss sustained bears a very striking proportion to the stimulating treatment the trees have received.

I intend, at the next meeting of the State Board of Agriculture, to move the offering of a liberal premium for the best essay on the best method of guarding against the destruction of fruit trees from this cause. The loss through the West during the past winter is almost incalculable, and cannot be repaired in many years.

Manures.—In the first settlement of this county, many persons fell into the gross error of supposing the fertility of the soil inexhaustible, and as a consequence, manure of no value; but the sad experience of some who corned thin land too long, and the superior intelligence of others, have nearly dissipated that error; and if there are but few who make manure, there are many more that save and apply to thin corn-land what naturally accumulates about their barns and stables. I must not, however, disguise the fact that we still have a few farmers (not book farmers either) who look on a manure heap as a nuisance, that they would thank any of their neighbors to remove from their premises; and I have myself very much obliged some of them in this way.

With much respect, your obedient servant,

JESSE MORGAN.

To the Commissioner of Patents.

Brookville, Franklin County, Indiana,
December 19, 1852.

Sir: Having received a copy of the Agricultural Circular from your Office, I propose answering some of the questions there propounded, and also to speak of some other matters connected with the great subject of agriculture.

The White Water river runs through the central part of the county, dividing it into two very nearly equal portions. The eastern portion, including the White Water valley, is composed of very rich soil, generally level and dry, and well adapted to the raising of wheat, oats, rye, corn, clover, Timothy, &c.; the western part is mostly hilly, of an inferior quality of soil, and better adapted to raising vines and grazing, though large quantities of the grains before mentioned are also raised there.

Ditching.—In portions of this and adjoining counties there are some wet lands. They may generally be called "marshes," rather than "swamps" or "ponds." Over a portion of them water stands during the wet season of the year, or during a considerable part of some seasons.

When the county was first settled by the present race of inhabitants, they were covered a great portion of the year with water, not deep, but extended all over them; the natural outlet to some of them being obstructed by logs and brush; to others by banks of earth, supposed to have been thrown up by beavers. The opening of these outlets, and clearing a part of the land, did much towards drying it; but still it was level, and the descent was not sufficient to drain it well. The soil was usually of the very best quality, and rarely failed, when the season suited, to produce large crops of anything adapted to the climate; but in wet seasons the seed and labor were often lost.

Within a few years under ground draining has been introduced, and is now pretty extensively used, producing most wonderful and valuable results. By making the outlets quite deep, sufficient fall can be obtained for the desired purpose. If the amount of water discharged by this be large, it should be a wide, open ditch; if the amount be small, the ditch may be narrow, and covered. Into these outlets lead several main branches, and the small ditches into these, connected with each other a river and its tributaries, or forming a system like the veins in the human body. The small ditches, running in every direction where desired, are usually cut from 2 to 4 feet deep, according to the position and character of the ground, and from 1 to 2 feet wide, according to the amount of water to be discharged. They are then finished in various manners. The most approved method, and the one more employed than all others, where stones are plentiful, is to build a narrow, dry wall from the bottom of the ditch, on each side, to the height of 10 or 15 inches; then cover the aperture with large stones; then fill in with earth over the whole to the level of the ground on either side. A little straw may be thrown in on the covering stones to prevent the loose earth from falling through; as soon as the earth becomes compact, it will retain its place, and not fall through into the open ditch. The common spade and shovel have usually been employed in ditching, though the plough is frequently used for filling them. For this purpose, the beam of the plough should stand at an angle with the share, or the common plough may be used with a long double tree, and one horse on each side of the ditch, though this is in some respects inconvenient. Ditching machines will soon be generally constructed and introduced, saving much labor and expense. Brick or timber may be substituted for stone. If brick are used, they should be well burned, though it does not matter so much where they are free from the effects of the atmosphere and freezing; if timber is used the most lasting kinds should be obtained, so that it may not soon need to be replaced. Another method of using stones is to cast them in loose, to the depth of a foot or more, and cover with the loose earth as before. That is said to make a very good and lasting kind of ditch. Another method, also, of using timber is to cut oak or some other lasting kind 18 inches or 2 feet in length; then split it into staves 2 or 3 inches in thickness, and the wider the better. Place one end of them at the bottom of the ditch on one side, and lean the other end against the opposite side, breaking the joints. Cover them as before. This will last most surprisingly. Another methed still that has been suggested, and perhaps somewhat tested, is to use earthen tiles, made in an open half circle and jointed, spreading out 2 or 3 inches on each side, to form a surface to sit upon, so that the waste water may ooze into it. Water pipes are frequently

made of this material, but they would not answer this purpose, as they are made with a full circle, and have no provision for the admittance of the water which will be continually accumulating along them. It is thought that the half circle open at the bottom will answer well. Iron would probably answer equally well, but would most likely be more expensive.

Open ditches are used by many; but the under-drains are in every respect preferable, unless a large amount of water is to be discharged. The latter drain the ground better; they never fill up if properly made they consequently involve no expense or inconvenience in clearing them; they occupy no ground; they are in the way of nothing else; and they are cheaper in the *long run*. The ploughman must turn at an open ditch, leaving on each side of it one-quarter or one-half an acre, or often more, to turn upon; but he may drive over the covered drain without the slightest inconvenience; and, instead of giving up one or two acres of his richest soil to the production of weeds and bushes, as is often done, he raises upon it the best grain in his whole field. These reasons grow into additional importance where numerous ditches are required.

But one of the most strikingly beneficial effects resulting from the draining of wet land is, that the nature of the soil seems to be entirely changed. Instead of being cold and heavy, as before, it becomes warm, porous, and light. Previous to draining, the water falling and standing upon it at some seasons, runs the particles together, and gives it the nature of tough mortar. As it dries, it hardens; the plough turns up clods, instead of loose earth; the roots of the vegetables planted upon it, being scarcely able to penetrate it, derive very little nourishment therefrom, and consequently are sickly, and languish for something to sustain them. On the other hand, when it has been drained, the water never stands upon it to destroy its porosity; the winter frosts raise it up and leave it loose and capable of absorbing all the nutritious elements afforded by sun, wind, rain, or decaying vegetation; the wheat, the corn, the oats, the grasses, send down strong roots into that part of the soil never penetrated before, and bring up abundant nourishment to increase the luxuriance of the already vigorous crops. Each successive year continues to improve the soil, as the injuries hitherto sustained by it are more completely removed, and as new and increased sources of fertility are opened. Any farmer can see this exemplified in breaking up his ground for planting or sowing. Let him select a field all of the same quality of soil; then let him plough one half of it when it is wet, the other when it is reasonably dry. The former will be cloddy and hard during the whole season; the latter will turn up mellow, and can be easily kept so, and will moreover be more productive than the former. Similar causes produce like effects in the two cases.

But not only is this method of ditching of advantage to *wet* lands, but to *dry* lands also. In all dry lands are numerous little branches or ravines, each of them occupying some space, and very generally making it necessary for the ploughman to turn at each, thus involving a loss of time and of land. Besides, these uncultivated places are usually permitted to grow up with weeds and bushes, from which the whole farm is annually seeded in case any part has failed to produce its own seed. At the heads of these, and frequently alongside of them, the grain is frozen out

during winter, or is drowned by the fall or spring rains. Draining will prevent all this, or at least prevent it from being more liable to these mishaps than other lands. In each case, from a quarter to a half, or even one or two acres, of the best land are reserved from worse than non-productiveness. Fields, instead of being cut up into two or three angling parts, as many are now, almost doubling the labor of cultivation, are made square. The rich, alluvial soil, that was aforetime carried off, more or less, by every considerable rain, is now almost entirely preserved. Last, but not least, of these advantages which I enumerate, is the furnishing of stock water. The sources of these springs being opened, and provided with a steady outlet, an unfailing stream of water flows from most of them during the whole year, yielding an abundant supply of water for stock where before it could not be obtained at the time when most needed, because an outlet for it could not be opened or kept open. All that is needed is a trough or reservoir of some kind to receive it, so constructed and placed as to be accessible, but not easily destroyed. Every item of expense will often be repaid in a single year, and at the farthest in two or three years, in the numerous advantages derivable therefrom. Any farmer may have his whole farm ditched in the best style in a few years, and scarcely miss the time, by appropriating a few days to this business each year; but I think he would find it much more to his advantage in the end to have it all ditched as soon as possible.

Corn.—Indiana, Ohio, and Kentucky are celebrated as the great corn-raising States of the Union, and the White Water valley is among the most famous in them for this particular production. The crop this year is not equal to common crops, because of the drought of the past summer; indeed, it was thought for a while that we would not have half a crop. The rains came finally in time to save it in a great measure, though a great many fields are lighter than usual. I suppose it might be called three-quarters of a crop. The price was remarkably low during the early part of the season; but the drought caused it to rise in price in a few days from 20 to 33 cents per bushel. The new crop is coming into market, and is selling at from 32 to 35 cents. Large amounts are taken on the White Water canal to market from this place, and Metamora and Laurel, all in this county. Too much corn is raised in all this region of country; many farmers run their ground down by planting it continually in corn. Not more than two successive crops of corn should ever be raised, even on the best of land, unless it is well manured; and *they* should be well cultivated; for I am convinced that a large crop may be taken off with less injury to the soil, if well cultivated, than a small one, if but half cultivated. I admit that several successive crops have been raised on some rich lands without entirely exhausting them, but not without injuring them. Rotation in crops is of great importance, and is generally too little attended to. Some farmers who have given it proper attention, find that, by judicious rotation, they can raise a crop of grain every season, and improve their lands continually. Corn was the most profitable crop a few years ago, (that is, brought in the most money;) but now it is often less profitable in that sense even than wheat and other crops; and then it exhausts the soil, whilst they enrich it. I have not seen a test made that could be considered conclusive, but am of opinion that the best method of feed-

ing would be when the grain was cooked, or ground at least, especially if fed to cattle. It could not well be made palatable to horses, perhaps, when cooked, or be made to repay the trouble when fed to them in small quantities, even if it could. Of the mode of culture of corn, wheat, and other crops, I will perhaps speak more particularly at another time, if others do not.

Wheat.—Next to corn, wheat is more raised than any other grain in this county. For several years it has been fast gaining in amount, and will very soon surpass the corn, if not in the number of bushels, at least in value. Much attention has been given to the introduction of new varieties. Some of them have been fully tested; others, not. Upon some, the millers or buyers pay a premium; others, they will only buy at reduced prices. This is one of the most effectual methods of approving or condemning a variety Machines are being introduced now for harvesting wheat, and some of them are designed to thrash, and partially clean it, also. They are truly labor-saving. The sickle has been laid aside, and the scythe and cradle will most probably soon give place to this machinery, worked by horse or steam power. Machines are already almost exclusively used for the thrashing. The last crop of wheat was a very good one. It was altogether free from rust, the fly, or the weevil, and was harvested in good order. Hands are always scarce in harvest, and demand high wages. In view of this, less wheat is often sown than would otherwise be. It all ripens within a few days of the same time, and must be cut or lost; hands must, therefore, be had, at whatever price. It is to be hoped that the introduction of the machinery above referred to will soon obviate this difficulty. The wheat crop, I think, will continue to increase. It is a profitable crop, renovating to land, always commands *cash* in market, and most of the labor which it requires can be done when other business is slack. Last year's wheat, during the spring and summer, sold for from 50 to 55 cents per bushel. This year's crop is selling at from 62 to 65 cents, and seems on the rise. (For the discussion of one point connected with wheat culture, see an article which I sent you a year or more ago) Spring wheat is seldom sown here; it is more uncertain than the fall varieties.

Oats, Rye, Buckwheat, Flax, &c.—A large amount of oats is raised here, but chiefly consumed at home; small quantities only are taken to market. There has been an increase in the yield per acre, arising chiefly from the better mode of sowing them; but there has been very little improvement in any other respect. The same kind of seed is sown as hitherto. A general opinion prevails that oats are more exhausting to land than anything else; this, I am satisfied, is an erroneous opinion. Rye is very little raised now. Buckwheat is still raised in small quantities, generally where some other crop has been taken off the same season. Flax is raised to a considerable extent; not as formerly, for the lint, but for the seed, which sells at from $1 to $1 25 per bushel, or even higher The lint is sometimes used in the paper-mills—of which we have one; but the seed is the great object. Hemp is seldom raised here; tobacco, I am happy to say, never. Broom corn is raised some seasons to a considerable extent, and is generally a profitable crop. When the business of broom-making was first introduced in this State, a few years ago, it was very profitable; but, like all such profitable employments that are easily understood, it was soon overdone. It is

hard on the land, soon exhausting its fertility. One crop will perhaps reduce the soil more than two crops of Indian corn. Barley is raised occasionally, but not in large quantities. In the western part of the county, on the hilly, poor lands, hops are raised to a considerable extent. I am not acquainted with their culture; but judge that they may be profitably raised by those who have very small farms. They also seem to grow well upon rocky land, and in poor soil. They are chiefly cultivated by German immigrants.

Vineyards.—The same class of persons, in the same part of the county, have planted, and are planting, vineyards. Some have planted half an acre, and are making additions from year to year; some have planted one or two or more acres. Many of the vines are already bearing well. They are usually planted on hill-sides facing the south. Various kinds have been planted. The proprietors who are experienced in the business say that these vines give promise of productiveness, and are remarkably healthy. This, again, is a business in which a small, very small, piece of land will support a man and family. The grape vine is considerably cultivated in yards and gardens for its luscious fruit. It is a great producer, and will amply repay all the labor bestowed upon it.

Renovating Crops, Grasses, &c.—Grasses are the principal renovating crops, and they are raised with a double or treble purpose, as, besides renovating the soil, they are designed to furnish hay and pasture. Hay is made in quantities sufficient for domestic use, as its great bulk *seems* to forbid the sending it abroad to hunt a market, though I think it probably would pay well. Grazing is altogether too much neglected in this State and in the western part of Ohio. Especially are wood-lands neglected. By removing the logs and brush—the scrubby saplings, that will never become valuable, and the decayed trees—and then cutting off the lower limbs from the trees and saplings remaining, the thickest forests may be completely set with grass, and be almost equal for grazing to cleared lands. This is seldom done with us; and thus very nearly one-half the entire surface of the earth is lost for all agricultural purposes, except to furnish timber, which it would still do equally well. As renovators, then, they are chiefly sown, but with an eye, in most cases, to one or both the other objects. Considered as a renovator alone, red clover is preferred to all the other grasses for dry land; it has large, strong roots, which perforate the earth, and thereby loosen it to a greater depth than any of the other grasses, and probably furnish more enriching matter in their decay. Besides this consideration, the soil receives more from the above-ground crop, leaves, &c., than is received from any of the others. When it is designed for pasture—for I cannot keep entirely separate the distinct heads without taking up too much space—for pasture, then, some Timothy is sown with the clover. It is thought that cattle relish it better, and that they are less liable to be injured by it when first put on it in the spring; though clover alone will produce more pasture. Timothy is very generally preferred for hay, though clover is perhaps most profitable, from the fact that it furnishes a crop of seed after the hay has been taken off, besides a large amount of refuse straw for manure. In wet lands Timothy is generally preferred to clover. One cause of this preference is, that it is less liable to be frozen out in those lands; but that reason will no longer exist when the draining of them is completed, which it is to be hoped will soon be done. Red top

is also raised to some extent in wet lands, and seems well adapted to them; but it is regarded as an inferior grass. It does not possess the strength and nutriment for cattle and other animals that Timothy and clover and blue-grass do, and I suppose the same is true as to furnishing nutriment for the earth. I have called clover a grass, and do not think it any great misnomer. Peas have never been raised here as a renovating crop.

Manures.—Well-rotted manures are the best of all renovators. These, I am truly sorry to say, are greatly neglected in this part of the country; but I am equally rejoiced to add that a great improvement is manifest in this respect. The best reason that I have seen given for this is the following: The early settlers, finding the land so rich, thought its fertility could never be exhausted; they, therefore, deemed it unnecessary labor to save or apply manures. Experience is only now driving this notion out of the heads of their sons and successors. Barnyard manures are now beginning to receive from many pretty careful attention, and other kinds that are easily obtained, especially where it is necessary to remove them out of the way. With a few exceptions, sufficient care is not taken to apply all that might be collected. Lime and plaster are seldom used; guano, so far as I am informed, has never been used at all. Every year is working a change in regard to these land restoratives.

Potatoes.—Sweet potatoes are not so much raised as Irish potatoes. They require a dry, warm soil, but a sandy soil is generally preferred. They are seldom marketed, but are designed for table use. Their culture would be vastly increased if a kind could be obtained that would remain sound during the greater part or all the year, as Irish potatoes do; but the kinds now in use cannot be kept, without much inconvenience, even for winter use.

Irish potatoes are raised in large quantities, being much used in most families as an article of food. They are also taken to market in considerable quantities at Cincinnati, which is the great market for almost all the spare products of the farm. They are sometimes fed to hogs, which do well on them. The potato is a very productive plant. More bushels of potatoes will probably grow upon an acre of ground than of any other kind of crop that we raise; but they also require a great deal of labor. Very many different varieties are cultivated. The potato *rot* has never visited us to any extent; indeed, I doubt whether the real disease has ever visited us at all. It has not been found necessary to seek a remedy, as the amount of injury has generally been so limited.

Other Root Crops.—Turnips, beets, and some other bulbous roots, are raised in gardens for table use, but are seldom made a field-crop for the feeding of stock.

Tomatoes.—But a few years have elapsed since the general introduction of the tomato plant; yet few, if any, garden vegetables are in so great favor. Tomatoes are easily produced in all kinds of soil, and the plants bear most abundantly. They grow best on light, alluvial soils, but, as I said, can be raised in abundance anywhere. There are a great many varieties of them, differing in size from the fraction of an ounce to two or three pounds in weight. The middle-sized varieties are usually the most esteemed for ordinary cooking purposes. In their common green state they cannot be preserved during the winter, but they are now extensively preserved in tin cans for winter and spring use. They

are cooked, as for the table, with salt, pepper, &c. Tin cans of various sizes, from one quart to two gallons, are made. Small openings are made in the tops of them, through which they are filled whilst they are yet warm, so that the air may be mostly expelled from them. These openings are then covered with small pieces of tin, and they are soldered, so as to make them air-tight. If they are kept where they will not freeze and thaw, they will remain good any length of time. I ate some in July or August that were put up in this manner the previous October, and so fresh and well did they taste that they could not have been distinguished from those just plucked from the vines. They should soon be used when opened, for they will quickly spoil when exposed to he air. It is therefore advisable that the size of the cans be made proportionate to the size of the family, so that, when one is opened, it can be used before it will spoil. Peaches, pears, cherries, and fruit, or berries of any kind, may be preserved in the same manner.

I find that subjects accumulate on my hands; but I have already occupied too much space. I should like to speak of the various kinds of stock—such as horses, cattle, hogs, sheep, &c. I should also like to write some account of the several fruits—such as apples, pears, peaches, cherries, &c. I should in like manner be pleased to write an essay on hedging, and say something of some other matters, also; but I must close. Should this be acceptable, and Providence favor, I may write on them hereafter.

Yours, most respectfully,

JOS. BRADY.

SWAIN'S MILLS, RUSH COUNTY, INDIANA,
January 3, 1853.

SIR: According to your request, I hereby attempt to answer such of your inquiries as I feel competent to answer correctly.

We put no guano on ground in this county; but we use common stable manure, increasing the crop of wheat or corn twenty-five per cent. by a light covering of the ground. The average crop of wheat is from fifteen to twenty bushels, seeding, from 20th of August to the last of September; quantity of seed, from one to one and a half bushel per acre; plough twice, or plough a furrow six inches deep first time; four the second; the yield is increasing; rotation not regular; few Hessian flies; no weevils; price 50 cents. Clover, or clover and Timothy, sowed in February or March.

Corn.—Average crop, forty bushels; cost, 10 cents, including rent. Culture: plough sward in fall, or early in spring; other ground, later; plant four feet wide in hills, three stalks in a hill; plough often while the corn is small; stop before the tassel appears, keep every noxious thing from the hill.

Oats.—Average crop thirty bushels; one and a half to two bushels seed per acre.

Clover and *Grass.*—Quantity per acre, one and a half to two tons. Clover is considered the best fertilizer; though Timothy mixed does well either for meadow or pasture; quantity of seed, three quarts per acre; cost of growing per acre, $3, clear of rent. Red clover is very good for

horses the fore part of the season, and by frequent salting they do well afterwards; but need grain when used any time.

Neat cattle cost (say) $4 per year; will bring $15 at three years old; good dairy cows, $18 to $20, spring or fall; one hundred pounds of corn will make (say) fifteen pounds of beef. The Durham, &c., are preferred, generally, by good farmers. I have never tried the experiment of weighing and feeding. The best plan for breaking steers is to yoke them while small, and work them frequently, and not beat them too much.

Horses are grown at a profit, and so are mules; rearing to three years old cost (say) $50. To rear good and serviceable colts, I should work the mother moderately, and feed her well, and let her have grass while suckling; but if you wish a mare to prove with foal, keep her from clover during the time of trial. The plan I prefer to break young horses is, to hitch them, when two years old, with an old, steady animal, and load them no more than the old horse can pull, together with the colt, until it inclines to pull well; taking good care not to let him get scared in gear; and if he should, never let him run away, for he seldom can be trusted afterwards.

Wool growing is not very profitable here; the cost of production equal to the price—say 25 to 30 cents; the cost of coarse wool nearly equal to fine. The lambs are more hardy and easier reared; the proportion of lambs to ewes varies from one half to three-fourths, or seven-eighths, according to the severity of the winter, (as they generally come in the winter,) and other circumstances; large sheep are most profitable either for mutton or wool.

The Berkshire hog has been reared here; but farmers do not like him so well as the improved common stock.

The Shakers of Ohio keep the best stock I know of. Farmers differ as to the best mode of rearing them: some say give them all they will eat; while my opinion is, half that quantity will make more pork, with the same grain; or, in other words, giving two hogs what one will eat, I think, will make more pork; for nature does much for growing animals. When I commence the process of fattening, I give them all they will eat. There is a great saving in grinding grain, particularly for young hogs; and either cook or sour it for rearing; but give it in dough for fattening.

Potatoes.—Average crop, four hundred bushels per acre, Irish, and two hundred, sweet. The best Irish are Meshanock and Pink-eye; the best sweet are the Spanish; but they are not so good to yield as the native yellow; the cost per bushel—say 30 cents for sweet, and 15 for Irish. Best mode of culture: drill for sweet, and hills for Irish, and ploughing and hoeing for both varieties; manure not necessary for sweet; where hogs have been fattened is the best for Irish.

Fruit is receiving increased attention; but peach trees do not flourish. Apples are a profitable crop. I view potatoes better for food than apples for any kind of stock. The best variety for keeping and exportation is the Genetting or Never fail; though many other varieties keep well—such as Wine sap, Canon, Pearman, Newtown Pippin, Vandevere Pippin, &c. We manure and improve our soil by clover more than any other way; though we use the manure from the livery or horse stable next to clover when easily procured, and think it more congenial for a cold, wet soil, or

rather better adapted to that kind of soil than any other manure or any other soil. No guano is used in this county.

Yours, respectfully, &c.,

JETHRO S. HOLGER.

JACKSONBURG, WAYNE COUNTY, INDIANA,
November 16, 1852.

SIR: Dr. Bunnel, to whom the Circular before me was addressed, has deceased. Before his death he requested me to answer this Circular, and in compliance with which I make the effort.

The staple products of this county are corn, wheat, and hogs. Until recently corn and hogs were the main reliance of the farmer, owing to two facts: first, the soil was new and very productive of corn; secondly, corn could be fed to hogs, which could be driven to Cincinnati, 65 miles, our nearest market; too far to haul wheat over bad roads. Since we have a canal and better roads to market, more wheat is raised than formerly; besides, the farmer begins to discover that our soil, that for the first 15 years of cultivation yielded from 50 to 70 bushels of corn per acre, without manure or extra cultivation, now requires manure and rotation in crops to maintain it in a state of productiveness.

But little attention, however, is paid to the saving and application of manure most economically; all that is done in that line is to gather up once a year, in the farm-yard, all the manure that has accumulated, and apply it to the poorest field, or the poorest spots in a field, before planting corn, or sowing wheat.

Corn is planted from the 20th of April to the 15th of May, according to the season.

If clover sod is to be planted, late fall or winter breaking is considered the best, on account of the sod becoming more rotten and the ground mellow. Fall ploughing, however, makes the ground obnoxious to the cut-worm, as most of the vegetation is thereby destroyed, so that the worm must depend on the young corn plants for sustenance.

When corn is to be planted in ground that was in corn or wheat the previous season, it is ploughed just before planting and harrowed. It is not generally ploughed more than six inches deep; but I am satisfied that deeper ploughing would well pay for the extra labor, from some experiments which have been made in the vicinity.

After harrowing, the ground is marked out both ways about three and a half feet apart, with a common shovel-plough; the corn is dropped by hand, and covered with a hoe; three stalks are designed to be left in a hill. This season there was a remarkable failure in corn coming up, owing, as it was supposed, to the severe cold of last winter, when much of the seed corn was yet in the field ungathered.

When the corn has been up about two weeks, it is gone over twice in a row with a cultivator or harrow; after which it is ploughed three or four times with a shovel-plough and hoed once. The average yield of corn per acre is about 50 bushels, though 100 is not uncommon; in such cases the corn is drilled. The cost to the farmer who owns the land is about 7 cents per bushel, or 14 cents to the renter. The average price at the nearest market is 30 cents.

Wheat is seeded from the 1st of September to the last of October; ground is ploughed but once. As much wheat is sown in corn as by any other plan; the yield however is not near so great as when sown on fallow or clover sod. Clover ground is generally ploughed just before sowing; the wheat is sown, then harrowed, which is all the labor applied generally.

Those who pay any attention to rotation in crops adopt the following plan with much advantage: first, one crop of wheat, then two of clover, then one of corn; the clover is sown in March or April, on the wheat.

One and a half bushel of wheat are sown per acre; harvest generally commences by the 27th or 28th of June. When sown among corn, 12 bushels are an average crop; on sod, 20 bushels. The yield is increasing; 30 bushels per acre is not uncommon without extra labor; price 52 cents per bushel.

Hessian flies and weevil seldom injure wheat in this region, though this fall the young wheat appears to be badly injured by the "fly;" I know of no remedy. The greatest enemy to wheat in this country is the "rust." The best remedy is to sow early varieties of wheat, and sow it early, so as to be ready to harvest early. The rust appears to "strike" all wheat at one time; after which, the grain does not increase in weight; hence it is obvious that early wheat will be the best.

Hogs are still the principal crop; they are generally sent to market at about 15 months old; average weight, 200 pounds net. The first 12 months of their lives they are fed merely enough to keep them in "growing order." Then commences, about the first of September, the "fattening," which consists in feeding them as much dry corn as they will eat until the first of December; during this time, each hog consumes about 14 bushels of corn and increases about 100 pounds net pork; it is worth $5 per hundred.

From a variety of experiments, I am satisfied that two points in the above plan are wrong: the first is letting a hog remain poor 12 months of its life, when it could be made as large in 9 months as it generally is in 15; the second error is feeding corn without grinding.

S. S. BOYD.

QUEENSVILLE, JENNINGS COUNTY, INDIANA,
December 2, 1852.

SIR: As rocks make the mountains, so items make a history; and if every man could give his fellow his experience, there is no doubt every man would see something to improve on, if not to imitate. Your valuable Report, so far as I am a judge, is the very medium calculated for that business; and it is, I think, a work that every practical and thinking farmer should have, if possible, in his family; it is so well adapted in its compositions to the wants, the intellect, and feelings of the farming community; and, although there are an abundance of agricultural journals, and good ones, which have been, and at this time are, working great changes in the farming class, for the better, still I consider your Report as a great boon to the community; and I hope that, as such, it will be upheld and encouraged to the fullest extent, not only by good contributors, but by the government as well.

The county I live in is fast emerging from a slovenly and unsystematic manner of farming, and what with the improvements of railroads and steam-power, scientific publications, the introduction of improved stock, of good and improved ploughs, farming mills, and other tools and implements for the saving of labor, we are continually progressing, so that we hope ere long to be able to rank with the first farmers in the State.

Our crops of wheat generally this season have been good—considerably over an average crop, but from 10 to 14 days later in harvesting, and the weather prior to that time very cool, indeed, for the season. We have had a remarkably dry and favorable time for wheat, oats, and hay, not having any rain worth mentioning till all was, or might have been, housed or stacked away, although our corn crops had like to have suffered in consequence; but, fortunately, before it was too late, we had copious supplies of rain, which did just save our crops, and that was all. Had the rain kept off one week later, a vast amount of corn in this section would inevitably have been lost; but as it is, I think the drought we suffered will not cut us (generally speaking) far out of an average crop. The worst part of the season, take it altogether, was in the spring, and the greatest inconvenience and detriment we suffered was in getting our corn to come up and stand the attacks of birds, and but more especially the mole. It is very common for moles to attack and eat the grain after planting (more or less) in this country in sandy or loose soils; but never do I recollect of their ravages being so early, so extensive, and general as this season; and it is a pity there cannot be found some certain remedy, some effective drug, in which corn might be steeped to prevent its destruction, both from birds and small animals of this kind. There is one thing, however, I have proved to my satisfaction—and that is, that the hardiness of white seed-corn in sprouting in a cold season far exceeds the yellow. The yellow, if it is sound, may come well in a good season, on a wet, heavy soil; but it will not do in a cold and wet spring; it will rot in the ground when the white will come tolerably thrifty.

Our fall here has been particularly seasonable for turnips, potatoes, and other fall roots and vegetables; but I hear many complaints of the rotting of the potato; nor do I believe the best at this time raised are as good in their eating qualities as they were some years ago.

Our wheat sown this fall looks well, having had so far the most favorable time for it I remember to have seen.

Very respectfully, your obedient servant,

STEPHEN CADBY.

BEDFORD COUNTY, TENNESSEE,
September 28, 1852.

SIR: I received your Circular some time since, and now attempt to answer the interrogatories therein contained, so far as I am prepared to do so. I regret that I am not able to give a more full and satisfactory statement.

Wheat.—No guano is used here in the production of this crop. The average product per acre has been about ten bushels. Time of seeding, from the middle of September to the middle of November; harvesting,

about the first and second weeks in June. Seed prepared differently, viz: sometimes soaked in brine, sometimes in water tinctured with blue-stone, sometimes simply poured into water, and all that will swim skimmed off, and sometimes sifted with a wire sieve; but, oftener than any other way, it is sown without any preparation at all. Generally one bushel of seed per acre; generally sown amongst corn, and ploughed or scratched once; sometimes sown on stubble or fallow ground, and ploughed twice—perhaps three inches deep. Yield for the last three years generally less than formerly, owing to the seasons. Average price, 75 cents per bushel.

Corn.—No guano is used in the production of corn. Average product per acre, eight barrels. All I can say as to the best system of culture is to plough deep and close, and stir the ground often whilst the crop is young. The only method of feeding here (or nearly so) is whole; but we suppose it would be better for horses and cattle, chopped, and for hogs, cooked. We prepare our ground for planting by ploughing twice, (in general;) then lay off rows about four feet distant each way, two stalks, and sometimes three, in a hill.

Peas and *beans* only raised in small quantities for table use. *Barley* not raised here. Average yield of oats per acre, twenty five or thirty bushels; quantity of seed sown, one and a half bushel per acre. Average yield of rye, ten bushels per acre; quantity of seed sown, one-half bushel per acre. Rye is considered renovating to land.

Clover and *Grasses.*—Quantity of hay cut per acre, about two tons. No fertilizers for meadows and pastures used. Timothy and herdsgrass are preferred for meadows; about one gallon pure, clean seed sown per acre. I do not know that red clover is injurious to horses.

Dairy husbandry is not attended to here, any of consequence, more than for family use. However, I think the average price of butter and cheese is about 12½ cents.

Neat Cattle.—Cost of raising until three years old, about $12 or $15; which is fully as much as they will sell for when fat at that age. Value of good dairy cows, either in spring or fall, from $10 to $20. It is thought that a given amount of food will yield more meat in a Durham than in the native breed. We generally break steers by yoking a wild one with a trained one.

Horses and *Mules.*—The growing of these animals is profitable. The expense of rearing a mule until three years old is about $45. Brood mares and colts should be treated tenderly, with plenty of wholesome food, and a shelter or stable in cold, rainy weather. The colts should not be weaned under four months old; and, when taken from their dams, should not be permitted to hear their neigh.

Sheep and *Wool.*—Wool-growing is not considered profitable here; therefore, we are not prepared to give the cost per pound, &c., &c. The number of lambs annually reared will, perhaps, not vary much from the number of ewes, though it frequently happens that the lambs die, very considerably, at six or eight months old.

Hogs.—The best breed is, in general, those which have been best raised and kept; though I have no doubt but that our breed of hogs has been improved not only by increased care and attention, but also by a cross with the Berkshire and other foreign blood. We have generally such an abundance of corn here, that we have not tried much to

ascertain the cheapest method of obtaining pork and bacon; but we find it profitable, in raising pork, to have red clover for hogs in spring and summer; and if our corn should be a little scarce, we find it cheaper to turn hogs on a field of oats, when the clover fails after harvest, than to buy corn to feed them. And after having eaten the oats, then turn them on a rye-field, which (if plenty of it) will keep them till new corn may be fed to them. Hogs can be fattened early in the season cheaper than late. Here, in order to save labor, and in that sense to fatten our hogs cheaply, we usually turn our fattening hogs into a corn field about the middle of September, and deliver them to the drivers about the 8th and so on to the 15th November. I know of no new or superior method of putting up pork and curing bacon. The common old method is in use here.

Rice.—This crop can be successfully cultivated on upland.

Cotton.—This crop is not raised in my neighborhood, except for family use.

Tobacco.—This crop is not raised in this vicinity, except in very small quantities, for family use.

Hemp.—The culture of hemp here is on the decrease, I think; average yield per acre, five hundred pounds.

Potatoes are only raised here for home consumption; yield per acre not taken account of; it is, however, tolerably good.

Fruit culture is not receiving great attention here. I have found that apples, as well as peaches, are worth something for hogs, &c.

Manures.—Our lands are, in general, rich, and we have paid but little attention to making or preserving manures. No lime nor plaster is used as a fertilizer; neither is guano.

Most respectfully, yours, &c.,

WM. BOONE.

Remarks.—Our correspondent says that "lands there are generally rich." If so, how does it happen that farmers in Bedford county fail to raise more than eight bushels of corn per acre? He says that the average product of wheat has been about ten bushels per acre; and concludes by informing his readers that "but little attention is paid to the making and preserving of manures." Our object in this note is simply to give a hint in favor of paying more attention to the manure heap, and not forget to try both lime and plaster.

D. L.

NEAR PINE GROVE, CLARKE COUNTY, KY., 1852.

SIR: The Circular from your Office for August, 1852, was duly received.

As far as my knowledge extends, no guano has ever been used in this region of Kentucky; nor has lime or plaster been used as a fertilizer. Our soil has plenty of lime in it.

Ground is generally prepared for planting corn by breaking up in the spring, as soon as the ground will do to work, with two horses or oxen, as deep as the plough can be made to enter. If sod-ground, it is frequently double-ploughed; that is done by running a plough which cuts

the sod two or three inches thick, and turns it into a deep furrow. The second plough follows in the same track, and is made to cut as deep as possible. The next round the foremost plough throws the sod into this deep furrow, and the other covers it. The ground is then laid off in checks or drills, and then planted. The corn is mostly dropped by hand and covered with a small plough called a bull-tongue. Of late years the planting has been much closer than formerly. Three feet six inches is now the most common distance, though many persons are planting only three feet apart. The number of stalks left in the hill is from two to four. The average product is greater than formerly.

The product of rye has gradually lessened until its culture is almost abandoned. It was cultivated extensively to be fed down with hogs. Oats have now, in a great measure, taken the place of rye. The product of the oat crop has been greatly increased. Into those fields intended for hogs, as soon as ripe enough, they are turned and permitted to stay until they have finished the harvest. Some years, red clover will salivate a horse in a few hours after eating it. I once saw a crop of hay made of red clover that would have this effect upon horses. The white clover has generally been considered much worse in this particular than the red. They are both much worse when closely pastured. This effect from the clovers has been much less of late years than formerly. I have frequently seen hogs salivated in the same way. Cattle sometimes eat so much red clover as to swell and die. The best remedy, if seen in time, is to run them until they will purge it off. If not able to run, a knife may be stuck just behind the most projecting part of the paunch, which will let out the wind, and thus save life.

Yearling steers are now selling at $25. I have just sold my three-year-old Durhams for $50 each. Native cattle would not have brought more than half those prices.

The growing and fattening of mules is now considered the most profitable business of the farmer in Kentucky. So many persons are engaged in it that it has increased the demand for young mules so much that large numbers have been brought from Indiana, Illinois, and Missouri, to be prepared for market in this region of Kentucky. They are generally sold again at two or three years old, and the price is from $75 to $150, according to quality. Some very inferior ones are sold lower, and superior ones higher. A feeder of mules told me to-day that the cost of feeding was about $3 a month the second year, and about $2 a month the first year from the time of weaning, which is generally at five or six months old.

Yours, respectfully,

SAM'L D. MARTIN.

To the COMMISSIONER OF PATENTS.

SOUTH UNION, KENTUCKY,
December 23, 1852.

RESPECTED FRIEND: I received your Circular in due season, and attempt a reply.

Wheat.—This is not regarded as a good wheat-growing country, but think it is more owing to the poor and slovenly manner of culture than

either to soil or climate. However, there is enough grown for home consumption, with some for other markets. There are several varieties sown, but the red may be, and is generally, preferred, being less liable to be injured by rust—and that is dreaded more than all other blights or disasters that happen to the crop. The average per acre of the crop of 1852 would not fall short of 15 bushels; but that is more than an average, taking the seasons together. Time of seeding, in the months of October and November; harvesting, from the 10th to the 30th June; usually sow 5 pecks seed to the acre, without preparation, only to have it clean; sod land, with ploughing from 6 to 8 inches deep, generally insures a good crop; subsoiling can be done to profit, and is practised by our best farmers. The average price at our nearest markets, from 50 to 60 cents per 60 pounds.

Corn largely cultivated; average yield per acre from 30 to 60 bushels. The kinds mostly cultivated are the large, late varieties, white and yellow. Some of the best farmers cultivate the small variety called Baden, which gives the largest yield, but is more tedious to harvest. There is nothing peculiar in the manner of culture; it is done almost entirely with the plough, cultivator, and harrow. It will cost 12 cents per bushel to produce corn, and it generally sells for about 20 cents.

Oats largely cultivated; average yield per acre from 30 to 40 bushels; two bushels seed sown to the acre, and sells for from 15 to 25 cents per bushel.

Clover and *Grasses*.—Clover is cultivated largely, mostly for grazing, and as a fertilizer; Timothy preferred for meadows, with a mixture of red clover for cattle; average of hay on our best meadows, from one to two tons, and costs from six to eight dollars per ton to produce it.

Neat Cattle.—The native, with crosses of the Durhams, are the breeds mostly kept in this neighborhood. It is not considered profitable to raise cattle except for family purposes; but it is generally believed that pure-blooded Durhams will pay better for the food they eat, either in the dairy or for meat, than any other stock known. In our society, we keep about 90 cows, mostly of the Durham stock; in one of our dairies, we keep 34 cows, and the last year they averaged, per cow, 100 pounds of butter and 15 of cheese, besides furnishing a family of 90 persons milk to drink three times a day, with cream for warm drink, and quantities of cream and milk used in pastry cookery, and raising 24 calves. Three other dairies not so large would give about the same result. Our cows graze on clover pastures six months of the year without any other food; the other months they are fed on hay, wheat, and oat-straw, cut up finely with Eastman's horse-power cutting machines. About one bushel of such cut hay and straw and 6 quarts of corn meal well wet and mixed together, is about the amount of food each cow consumes per day, with an occasional feed of turnips. The average price of Durham cows, from $30 to $50; other breeds, about $12.

Irish and *Sweet Potatoes*.—The Irish has not yielded, or been of so good quality as formerly; several varieties are cultivated, but the Meshanock is generally preferred, and brings the best price in market; very early or very late planting succeeds best—say in March or first of July. We planted a lot this season the first of July, that yielded at the rate of 240 bushels per acre of excellent quality; whereas we planted other lots in May and June, that did but little good. The soil should be a rich,

light loam, well prepared, laid off three feet each way, and from two to three potatoes put in each hill without cutting. There is more attention paid to sweet potatoes since the rot in the Irish. They can be produced in great abundance in this section by giving them that attention they deserve. We usually put out seed in hot-beds early in March, and have slips by the time it is safe to escape the frost, early in May. We usually select a light, sandy, rich soil, and prepare it well, make up in hills 3 feet apart each way, open the hills on the top with a hoe, put in the plants by pressing the earth to the roots with the hand; cultivate well, by keeping them clear of weeds and grass, and they seldom fail of producing from 150 to 200 bushels per acre; average price about 50 cents per bushel.

Manures are not receiving that attention that their value and importance demand; none used only from the barn-yards and the droppings from the animals, and no means used to increase it by litter. I am of the opinion that lime could be used to profit on our lands in the production of wheat, as that ingredient seems to be lacking in our soils; it would cost from 8 to 10 cents per bushel in this neighborhood. Still having fresh lands to clear up, our attention seems to be devoted to other branches of industry; but the time is not far distant when we shall be compelled to give more attention to that branch, or our country will cease to be regarded as a fertile one. I have thus endeavored, in my humble way, and in as brief a manner as I could, to answer some of the interrogatories in your Circular.

Respectfully, your friend,

URBAN E. JOHNS.

CITY OF INDEPENDENCE, MISSOURI,
November, 1, 1852.

SIR: In this county, (Jackson,) which is the upper county on the south side of the river Missouri, and bounded on the west by Nebraska Territory, is, perhaps, as much good land for cultivation as any in the State; it is well watered with good water privileges, and has a good deal of fine prairie; yet farming is not flourishing: it is in that state in which it cannot remain. The great Pacific railroad which is projected meets with so much conflict from a variety of interests that its completion cannot be calculated with any certainty until a greater uniformity of opinion prevails. Were this matter settled, an impulse would be given to every kind of industry; while it remains unsettled, business will languish, capital will be diverted into other channels, and with it enterprise.

As to the cultivation of wheat, it is not sufficient to supply the county. The land is rich; but the manner of cultivating wheat is very bad; its cultivation is almost abandoned. I have, in some instances, remonstrated with farmers about the manner in which they prepare their land for a wheat crop. It is usually put in amongst corn, either before it is cut up (when it is ploughed in, being covered very shallow) or after the corn is cut up and set up in shocks; the ground is then ploughed about two inches deep and sown, and then harrowed with a light harrow; this is done in October.

In one field I observed the wheat was in some places too thick, in other places too thin; but the great fault is its liability to winter-kill. All this they acknowledged was true. Wheat-growers do not improve in the cultivation of it, because they cannot have it converted into flour for want of mills; and because they have to pay, when ground, 15 cents per bushel, cash, or about one-fourth, to the miller. Men of capital will not build good mills, because the farmers do not cultivate wheat.

Farmers never think of manuring, as a general thing, either for corn or wheat. Corn is the great crop cultivated in this State; this year, when it has been well cultivated, it has been above an ordinary crop. Within a few miles of this city, a farmer, who is one of the best, cultivated a field of between twenty and thirty acres, from which he gathered one hundred and thirty-three bushels from each acre. I have been credibly informed by a number of farmers that the average crop this season will be forty bushels per acre; the uniform price of corn from this time until Christmas is 20 cents per bushel; forty bushels, at 20 cents per bushel, is $8; total cost of labor, $4; profit per acre, $4. Thus, one hundred and thirty-three bushels, at 20 cents, is $26 60 clear per acre.

The simple preparation is, to plough the ground well and deep, then cross-furrow it four feet apart, plant the same in the furrows; as soon as the corn appears above ground commence ploughing, which is continued until harvest. Even from their corn but little profit arises to the farmer. Why? If he sells to the merchant at 20 cents, he receives his pay in merchandize; if he ships it to St. Louis he risks sinking money, freights being very high; even there it commands a very low price; if he puts it in store, it is a losing business.

Hemp.—This crop, a gentleman informs me, is on the decrease in this county. He also says there is no new way of preparation for market; and that the average price per cwt. is $3; at the river bank, 600 pounds is the amount per acre; this, at $3 per cwt., is $18. This produce is a loss to the planter; he cannot estimate his labor at less, per acre, than $15. In the counties of Platte, Clay, Ray, and Carroll, on the north side of the river, opposite Jackson, the corn and hemp crops are very fine this season; the average of hemp will be about nine cwt. to the acre. The cost of cultivating an acre of hemp, from the planting in the spring until it is delivered at the wharf at St. Louis, is about $20. If it sell for $4 per cwt., each acre of 900 pounds will pay $36 20—$16 per acre. In the last-named counties the corn, per acre, will average forty-five bushels; this, at one-fourth of a dollar per bushel, equals $11 25; cost of cultivation, $6—net, $5 25. Now if we multiply $5 25 by 3 we have $15 75; so that three acres of corn equal one of hemp.

In Carroll county a farmer, with whom I resided a considerable time, cultivated about sixty-five acres of hemp; it ranged from six to ten feet in height, and very thick; he estimated one thousand pounds to the acre. A part of his ground was in hemp for the eleventh year, and improved every year; this year he intended another improvement, namely, ploughing it (the same ground) over in the fall; indeed, he commenced as soon as his hemp was cut and set up in stacks. This I suggest for the benefit of hemp-growers. There is another thing I will suggest: Hemp stubble, ploughed deep and early, sown in wheat, would unquestionably produce a good crop.

Neat Cattle.—The usual price of neat cattle at three years old is about $8. The average price of milch cows may be estimated at $12; fine cows sometimes at $20. Oxen are in great demand, especially at some seasons of the year; they vary from $50 to $80 per yoke; they are much in the Santa Fé trade; they are in great demand by the emigrants in the spring of the year, sometimes rising to $100 per yoke:

Horses and *Mules.*—The growing of these animals is very profitable; they are almost the only source from which farmers obtain cash; tolerably likely horses, from four years old and upwards, will sell for $75 to $100 cash; whilst prime mules are easily raised; sometimes mares fail in breeding them; they are much used, and greatly in demand, and sell very high; a fine young mule of three years old will sell as high as $75, sometimes more; the average for good mules is from $70 to $100 in cash.

Sheep.—But very few are raised, unless the farmers manufacture the wool themselves, which is expensive; as they have to pay for carding, 8 cents per pound; and if they sell the wool, they only get 15 cents per pound.

Hogs.—The best breed of hogs is the Irish Grazer crossed with home stock. Farmers find it unprofitable business either to make pork or bacon; the home market is not only uncertain, but they cannot turn it into cash; the merchants are the purchasers, who will not buy unless they can pay in merchandize, and purchase low—say at from 6 to 8 cents per pound; and all merchants' sales, except in this way, are for cash. Farmers have no stimulus to industry as matters are now in Missouri.

Root Crops.—Beets and carrots are cultivated, as yet, only in gardens; they grow well, and are juicy and sweet; no experiments of field culture have been made as far as my knowledge goes.

Potatoes.—Both sweet and Irish are cultivated to so great an extent as to show that as soon as there is a market, there can be any amount made; the Irish sell at 25 cents per bushel; the sweet potato at 50 cents. *Turnips* are cultivated to a considerable extent, both for the table and for stock; they sell at 25 cents per bushel.

Fruit.—Farmers are beginning to turn their attention to this part of husbandry, in promoting the culture of all varieties of fruit, small and large, and also the grape, to a considerable extent. Apples sell at 50 cents per bushel. The fruit crop here, as elsewhere, is a short one. I add no more.

As a matter of course, the foregoing, necessarily, is desultory; I collected my materials from every source that presented itself—from gentlemen of intelligence, from observation, and from facts coming under my eye.

Yours, &c.,

JOHN C. REID.

To the COMMISSIONER OF PATENTS.

P. S.—The cutting of hemp is exceedingly hard work; he who contrives or invents a machine to facilitate the cutting of hemp, will inevitably make a fortune; to cut half an acre in a day is a hard day's work.

HAZEL RIDGE, GLASGOW, HOWARD COUNTY, MO.,
October 11, 1852.

SIR: Herewith please to receive answers (as far as is in my power to give them) to the interrogatories propounded upon "*rural affairs*" in your

Circular of August last, received through my esteemed friend, Hon. John G. Miller, member of Congress from this district.

Wheat.—Guano is not used as a fertilizer or a manure for agricultural purposes in this State. Average crop, ten and eleven bushels per acre. Time of seeding, August or September. Little, if any, spring wheat is grown in this State. Wheat is sown among the corn and ploughed in shallowly, with the stalks standing; or the corn is first cut up and shocked, and then it is sown and ploughed in; or it is sown upon fallow ground, after it has been turned over and harrowed in, or ploughed in with a shovel or share-plough. Quantity of seed per acre, one and a half and two bushels. I think that the average product has varied little since 1825. Our rotation system of cropping is corn, wheat, and clover, alternating in the order named yearly. Average price at Glasgow Straw Mills, 60 and 65 cents per bushel. Clover seed is the only grass sown upon wheat ground early in the spring; and I consider this mode as good as any other for putting in this grass as a fertilizer, although there are many good farmers who sow clover seed with oats in the spring.

Corn.—Average product per acre, fifty and sixty bushels. The best mode of growing this crop is considered to be by breaking up the soil eight and ten inches deep, early in the spring, (1st to 20th of April,) with a share-plough, planting three feet apart each way, so as to keep the ground clear, with two furrows in a balk each way, and leave two or three stalks in a hill, as the soil will bear. I doubt not that ground or boiled corn is best for cattle or for feeding hogs, although, owing to the little labor that is here required to grow this grain, no preparation of food is cared for.

Oats.—Seed sown per acre, one and a half to two bushels. Average crop, thirty and thirty-five bushels.

Barley, *rye*, *peas*, and *beans* have little or no attention paid to them.

Clover and *Grasses*.—This is a fine country for grasses of all kinds. Timothy is the growth for hay; three tons per acre the average crop, without any manure or attention, except to keep off stock from it after the 1st of April. Herdsgrass is grown by many farmers. Horses or mules will grow poorer daily if kept upon red or white clover after 1st of August, from the excitement of the salivary glands, which it produces when eaten.

Dairy Husbandry.—Little attention is paid to this business, except butter-making for domestic use.

Neat Cattle.—I have no experience in fattening cattle. Breaking steers is easily done by yoking together a couple that match evenly (as to size and strength) and placing them between the tongue and lead oxen in a wagon or cart.

Horses and *Mules*.—I never heard of a person who engaged in this business of raising horses or mules failing to make money. If well kept, $10 per head will cover their yearly expenses. Brood mares and colts must have what grain and hay they want during cold weather, and plenty of good pasture in summer, to thrive and be profitable to owners. Kindness I have generally found to succeed far better than the "knocking down and dragging out" plan of breaking horses and mules.

Sheep and *Wool*.—No sheep of consequence grown in this part of the country, except for mutton and clothing.

Hogs.—I consider the cross of Woburn and Berkshire as the best breed for pork. In the frontier counties of the State, the cheapest and

best method for producing fat hogs is to grow them upon the mast (nuts and acorns) alone. These hogs would run, in fright, from an ear of corn thrown at them. But in the densely-populated counties, the most economical method of growing pork is to keep no more hogs than can be kept in good order within the enclosures of the farm. Corn is so plentiful and low here (generally 20 cents per bushel) that I have never experimented in feeding those animals enough to say how much pork a given quantity of corn will make. I generally put up my hogs for fattening in a pen, through which runs a stream of water, about the 1st of October, and keep them upon what corn they will eat from the ears until the weather will permit the killing of them for my own family use, or for market. They eat during that time twelve or fifteen bushels each. On the day after killing I salt down with L. B. salt, having first rubbed upon the hams pulverized saltpetre. The salt having done its part, I hang up in the smoke house—hams highest—upon hooks in the rafters, shoulders next below, and sides lowest. Smoke well with green hickory wood; and, when finished, put all down in dry ashes. I never see a skipper.

Cotton.—Although in 1820 and 1825 there were several fields planted and produced good cotton in this and the neighboring counties, the culture of this plant is now discontinued.

Tobacco.—Average yield per acre, one thousand pounds. Cost of production, $1 50 and $2 50 per hundred pounds, according to quality and the soil upon which it is grown.

Hemp.—This is my principal crop; and I presume that in this county (Lafayette, Jackson, Saline, Clay, and Platte) the principal part of the Missouri hemp crop is grown. Average yield per acre, eight hundred pounds. Cost of production, three cents per pound. The crop this year in Missouri is about two-thirds of an average product.

Potatoes (Irish.)—Average yield, two hundred bushels per acre. No rot hereabouts. Meshannock, Vermont, and Blue are the best varieties. Cost of production, 10 cents per bushel. Few potatoes are exported from this part of the State, and few farmers grow any more than enough for their own tables.

Turnips, carrots, and *beets* are grown only as kitchen garden vegetables.

Fruit Culture.—The culture of fruit is receiving increased attention. An apple orchard may be made the most profitable enclosure upon a farm. From my orchard of one hundred and thirty trees of winter apples, I average twenty bushels per tree in a favorable season. I permit the stock (hogs only) to run in the orchard and eat the fallen fruit. The Cannon, Genitting, New York Pippin, Father Abraham, and Newtown Pippin, I rank among the best varieties. These will keep till spring, if carefully barrelled. A three-quarter-inch auger hole should be bored in each head of every barrel previous to storing in such a place as will preserve them from frost.

Manures.—With these I have no experience; all made are put upon my garden. Our lands are kept fresh by the rotation of crops heretofore mentioned.

All which is respectfully submitted by your obedient servant,

J. T. CLEVELAND.

To the COMMISSIONER OF PATENTS.

POST OFFICE, WARREN COUNTY, MISSOURI,
November 15, 1852.

SIR: In replying to the inquiries propounded in your Circular, I shall confine myself to those subjects with which I am most familiar.

Mules.—To the raising of mules more attention is latterly paid in this section of the State; young mules, five months old, readily sell at $30.

Potatoes.—I had prepared a piece of land, not very rich, for grape-vines by trenching it about 18 inches deep. The young vines not occupying the whole ground, I put in some potatoes by making holes with a stick about 4 inches deep, into which the seed potatoes were thrust down, one in every hole, and three feet apart. They came up very well, grew to an enormous size, and yielded about four times as much as when planted in the ordinary manner. The new potatoes were all found near the surface; no working of the ground was done during the summer time. Cabbage, crisped cabbage, turnips, and other greens grow also astonishingly well on ground thus prepared without any manure.

Fruit culture is receiving increased attention. The Germans of this vicinity use to great advantage small and simply-constructed drying-houses (the stoves made of bricks, like a baker's oven) to dry their apples and peaches. The price of dried fruit latterly has nearly doubled.

Pear Trees.—I never have had as yet a single one of my pear trees destroyed by the *blight*. Our climate is rather too warm for the pear tree, which is consequently to be sheltered in some manner against the ruinous effect of our hot sun. I prefer to plant mine close to the north side of a fence running east and west, keeping thus, and by some low branches which I suffer to grow, the trunk of the trees, as well as the ground near it, completely shaded all summer. Do not stir the ground around the trees during the warm season. A heavy soil, of middling richness, not swampy, but not too dry either, with a subsoil well penetrable for the roots and moisture, suits the pear tree best. Before planting, make a hole at least three feet deep. It will do to graft the pear-tree scions on apple roots, (in want of pear-tree roots;) only transplant them a little deeper, to cause them to make roots of their own. Do not expect fruit from your pear trees before they have grown to a considerable size; never raise young fruit trees on too rich ground. Do not overlook what is called the Virginia crab apple; for making cider it greatly excels all other varieties. What the Germans call *coputiren* (to marry or join) is in most instances far superior to the common mode of grafting or budding, and may at convenience be done from November to the end of April. Transplant either in November or December, or late in the spring when the buds begin to swell; do it with all possible care, for the trouble saved in transplanting you will have to pay dearly afterwards. Prune little, but regularly and systematically. Sweet apples are excellent food for hogs; in transplanting peach trees, cut them down to three or four inches; prune them carefully in the first years, in February and August. The common sorts of peaches grow well from *cuttings;* manage them just as grape-vine cuttings; they make better fruit than seedlings. We know nothing of the *yellows* on peach trees; but, to prevent their being destroyed by the frosts, are bound to choose very elevated situations. Plum trees grow well here, and bear little; I raised more and better plums, in a rough part of Germany, with very little trouble, than I can do here with the greatest care. I have not succeeded with the European walnut; I would

like to make trials with the black mulberry, the German hazelnut, and others, but my imported seed did not grow. For cherries, too, this land is less adapted than most of the European countries.

Wine.—In a former report I communicated my experience on the culture of the grape-vine and the manufacture of wine. Last spring our grape harvest was mostly destroyed by heavy mildews at the blossoming time; I saw some vineyards that had escaped more or less—it is difficult to tell for what reason. It seemed to me that their situation was rather less open and airy than is generally deemed advantageous, and that they were in some manner sheltered by opposite heights from the injurious effects of winds from the southwest. It is still my opinion that the Catawba, though doubtless highly recommendable in every other respect, is a little too delicate for our climate in the Far West, and that repeated experiments should be made with the cultivation of the native vines of this and the neighboring States. My own experience on such trials I shall be able to communicate in a few years. Catawba wine will, under proper management, improve in the course of some years so considerably as to surpass nearly any similar beverage imported from foreign countries. But the *taste* of the majority of our people has first to undergo a change for the better before wine-raising will find due encouragement in this country. A moderate use of genuine native wine (besides beer) ought to take the place of whiskey and brandy.

I have commenced making *hedges* of the Osage-orange, and hope to succeed.

Hops.—Latterly the attention of the Germans in this vicinity has been directed to raising hops; they follow the manner adopted in Europe, and have thus far succeeded beyond expectation. In St. Louis, where several thousand dollars are annually expended for that article, no imported hops bring a higher price than those raised in our own State. The demand is increasing steadily. It is highly desirable that competent persons in the Northeast should give public information about the rules for raising this valuable product in this country.

I was raised in a hilly country of the Old World, but I never saw there hill-side fields, though they had been perhaps for a thousand years in cultivation, so badly washed as they are here done in one single year. Some of our hill places are already ruined beyond redemption—and this is a *new* country. Farming in the old style will do no longer; we are bound to restrain the culture of *grain*—to put more of our ground in clover and grass, and to try to make something from fruit, wine, hops, and the like.

Yours, very respectfully,

FREDERICK MUNCH.

MENDON, ADAMS COUNTY, ILLINOIS,
December 10, 1852.

SIR: Your Agricultural Circular came to hand in due time, for which please to accept my sincere and hearty thanks; not so much for the act of courtesy as for the evidence it affords of the interest the general government is beginning to feel toward the agricultural interests of the

country generally, and to the great valley of the West in particular. I think I speak the sentiments of nine-tenths of the laboring people of the land when I say that no public documents issued from any department are read with so much satisfaction as your annual Reports, both mechanical and agricultural; and the reason is a very plain one: they are wholly divested of every germ of political or sectional character, and treat of subjects that interest the great mass of our laboring population.

I am fully aware of the fact that manual labor, either of a mechanical or agricultural character, when followed as a necessary means of obtaining a livelihood, is considered by some as a degrading employment throughout our land. With amateur farmers, who cultivate large tracts of land by servitude, voluntary or involuntary, I have nothing to say; they do not come within my range; I speak of those who toil early and late, through sunshine and storm—who wear out their lives with the cast-iron drudgery of hard labor to feed a nation which otherwise would starve—who are classified by polite circles as the connecting link between the brute creation and themselves—who wear out a life of sorrow and toil, and sink into the grave, to be forgotten like the beasts that perish.

It is the name and character which our nation has given to a life of labor and toil that are driving every young man who can sport a black coat and a yellow glittering watch-chain into the counting room of the merchant, the laboratory of the village apothecary, or the office of a fifth-rate practising attorney; from whence, after the usual twelve weeks' apprenticeship, a swarm is sent forth to fill those polite circles with merchants who have paid 10 cents on the dollar, physicians who have filled our church yards with the victims of their quackery, and brawling lawyers who have sported their shingle in some obscure village corner; but have never seen a brief in their brief lifetime.

To the charge of belonging to that despised race of hard-working men I plead guilty; I submit to my fate without a murmur or a sigh. But as your limits, and my time, forbid a prosy essay, I will reply, briefly, to some of the queries set forth in your Circular.

Wheat.—There is something radically wrong in the management of the wheat crops of Illinois; of this I am fully satisfied. We employ no manure, of course, on our prairie lands, for none is wanted in the production of a wheat crop; on the contrary, I believe most of our land is too rich for wheat. In proof of this fact, our best wheat crops, and the most sure, are produced from the first cropping of the land, before the long, tough roots of the native grass are fully decomposed. The prices of wheat ranged in 1852 from 60 to 75 cents per bushel; average product per acre, ten to fifteen bushels. As an offset to this, we must purchase or hire a reaper; if we purchase one of McCormick's, the price is $130, cost and freight; if we hire, the price is from 50 to 75 cents per acre, which is about half the cost of harvesting. In thrashing we must do the same way—purchase or hire, which will cost 5 cents per bushel for wheat, and 3 for oats; other expenses about as much more.

To show the cost and profit, I will present you the following, in tabular form, for 1852, on wheat, corn, oats, and apples—one acre each—with the yield in bushels, and the price of each per bushel, fifteen miles from Quincy, our market.

WHEAT.

Land rent	$2 00
Ploughing twice	1 50
Seed, one and a half bushel	1 00
Harrowing and sowing	75
Harvesting and stacking	1 50
Thrashing machine	62½
Taking to market	62½
Hired help and board	62½
Total cost per acre	8 62½

Yield in bushels, per acre, 12½; total market value, $8 25; loss, 37½ cents.

OATS.

Rent	$2 00
Ploughing once	75
Seed, two bushels	50
Seeding	50
Harvesting	1 00
Thrashing	1 20
Marketing	1 20
Hired help	1 00
Total	8 15

Bushels per acre, 40; total market value, $10; profit, $1 85.

CORN.

Rent	$2 00
Ploughing in fall	75
Seed, say	10
Harrowing and planting	50
Ploughing four times	4 00
Gathering	1 00
Total cost	8 35

Bushels per acre, 50; total market value, $12 50; profit, $4 15.

APPLES.

Rent eight years - - - - - -	$16 00
Cost of trees - - - - - -	5 00
Interest for eight years, at ten per cent. - - -	4 00
Care of trees eight years - - - - -	8 00
Total cost for eight years - - -	17 00

Cost of 40 trees 8 years old, $17.

The next two years will pay rent, and for the trees. Good winter Genitens, at ten years old, will yield ten bushels per tree; worth 75 cents per bushel. Forty trees—ten bushels per tree—will produce 400 bushels; worth, at 75 cents per bushel, $300. Deduct cost for eight years, ($17,) and you will have a clear profit of $283.

Remarks on the above Table.—An acquaintance of mine last spring purchased eighty acres of land, for which he paid $1,200. On this tract were two acres of orchard and about eighty trees sixteen years old. While on a visit to him in the fall, I observed some ten or twelve trees of the winter Geniten hanging very full. He asked me how I thought they would yield to each tree. I replied, about seven bushels. He then told me he had gathered some of them, and that they measured ten bushels to each tree, and would bring 75 cents per bushel at his door; and that they had borne equally well for the last five years. I had no reason to doubt his word; and on his report I have founded mine; and let it go for what it is worth.

In travelling through the Genesee valley, in the State of New York, during the past summer, the greatest wheat-growing section in our country, I made inquiries of intelligent farmers if their land, from a long course of cultivation, did not depreciate in fertility like the old Eastern States? Their reply was: We make use of all the manure we make on our lands; but our principal remedy is clover. Every spring we go over our wheat and scatter on clover seed; the next spring we usually mow the first crop; and then if we wish to put in wheat in the fall, we turn under the second crop when in full blossom, and in this way we keep up our lands so that they produce as well as they did when first brought under cultivation thirty and forty years ago; and we feel pretty sure of getting 25 to 30 bushels of wheat to the acre.

Such is the response which the farmers of the Genesee valley gave to my inquiries on wheat-growing; but, so far as my knowledge extends, clover has not come into use in the wheat culture in this section; but there is little doubt, in my mind, that its introduction here would start our wheat crops up to the figure quoted from the valley of the Genesee, or nearly that point. Our usual depth of ploughing for wheat is from 4 to 6 inches; with this uniform depth of ploughing our soil depreciates, in my estimation, about six or eight per cent. annually, but with several counteracting causes: first, from a rotation with corn and oats; second, deeper ploughing, which improves the soil very much; and third, ploughing under stubble, corn stalks, and the like, *versus* burning them off.

Our staples are corn and pork; as corn, in the way we cultivate it, is more natural to our system than wheat. In the tabular estimate which

I send you, corn is put at 25 cents per bushel; this is its relative value, which is far from being correct when compared with its value fed into pork. According to the best estimate made by old corn-growers on the comparative value of corn fed into pork, it increases in a ratio of 10 per cent. in a manner as follows:

If pork is worth	$2 50	per	100 lbs.,	corn is worth	25	cts.	per bushel.
"	3 00	"	"	"	30	"	"
"	4 00	"	"	"	40	"	"
"	5 00	"	"	"	50	"	"
"	5 50	"	"	"	55	"	"

Pork is bringing, at this date, in Quincy, $5 50 per hundred pounds; so that the comparative value of corn is 55 cents per bushel, while its relative or real value is 25 cents cash.

This fictitious valuation (if I may so call it) arises from the estimation that ten bushels of good corn will fatten a full-grown hog; and that it will take another ten bushels to make a full-grown hog out of a decent pig.

Another estimate has, by unanimous consent, been agreed upon between farmers—that half of the quantity, ground into meal and cooked, will make an equal quantity of pork.

The best method of cultivating our corn crops where we do not use the hoe, especially if corn follows the wheat crop, is to begin with fall ploughing to a good depth—say eight inches; the frosts of winter will pulverize the soil and make it as mellow as an ash heap. In the spring, from the 15th of April to the 15th of May, we first cross-harrow; and then, with a light plough and one horse, lay it off in rows, four feet each way, and plant in the crossings; three plants in each hill is a sufficient number of our largest kinds of corn, after the birds, mice, and squirrels have taken all they can get. When the young plants are up so that we can see the rows, we plough the corn, turning the soil from the hill the first two ploughings; our last two ploughings, we turn the soil *to* the hill, and plough three furrows between the rows. This is after the old Kentucky pattern of corn-growing, and with a good horse, a man faithful to his work will cultivate twenty acres, and have it laid by at harvest time. I have known as high as eighty-five bushels of shelled corn grown to the acre without a hoe going into the field; but this is not an average estimate; from thirty-five to fifty-five bushels to the acre is high enough.

Corn lands have been in cultivation from twenty to forty years, and produce good crops yet; but this remark applies more particularly to our river bottoms than to our upland prairies. Corn lands can be renovated very much by ploughing under the stalks, instead of raking them and burning them off, as is practised by some; as it keeps the land light and loose; whereas raking and burning must, in time, run down the soil.

Oats cannot be a profitable crop to raise for market at this distance; consequently none are raised, except for the home market and for feed. There are two very serious objections against an oat crop which every farmer feels decidedly: first, it is a crop nearly as expensive as a wheat crop; second, it impoverishes the land in a ratio of from eight to twelve per cent. on every crop; which is altogether too high a deduction from the productive qualities of the land to follow up for any given length of time.

I have already spun my communication out to such a length that I shall be compelled to be very brief on the other points inquired after in your Circular, and many of them must pass over unnoticed.

Root culture is not receiving that attention which I know it richly merits as a field crop. Our prairie soil is well adapted to it, being a rich vegetable mould, light, loose, and deep; the main difficulty is the want of cellars to keep the roots from the frosts, and the hot, dry weather, which makes it extremely doubtful about getting the seed up, and the young plants a good root hold. When these difficulties can be obviated, give us our dry prairie land against the world on root crops.

The figures which I send you in tabular form, on fruit culture, are correct in the main, founded on personal knowledge, on the results of this year's observations, enormous as they are, and from observations extending back 10 and 12 years. The culture of fruit, I may safely say, has been increasing from 25 to 50 per cent. during that whole time; the demand is just as firm, and prices rule as high as at first. The most inveterate enemy that man has to contend with in fruit culture is the borer. I have dug and slain every *one* I could find in the spring, and searched closely at that; by midsummer I have gone the rounds again, and found just as many old fellows boring away at my trees, determined to kill them all. I have washed my trees in soft soap, strong lye, milk of lime, and everything I ever heard of, and some things I never heard of and nobody else ever heard of, and I find "it aint no use." I have got to give up, my trees are dying, and I must either plant out more trees, buy apples if I have any, or go without.

The best remedy which I ever tried to keep peach trees alive and healthy is, when the tree is three or four inches in diameter, to drive two eightpenny nails into it, close to the ground, so that they may cross each other at right-angles and divide the tree into nearly four equal parts; the tree will soon grow and cover up the nails; or mix sulphur and soft soap, and rub down the trees in spring and midsummer, and cultivate the ground around the trees. It is a mistaken idea to suppose that peach trees can thrive and do well, without cultivation, any more than cabbages. I never had half the difficulty with the peach that I have with the apple in cultivation.

TIMOTHY DUDLEY.

MONTELLO, MARQUETTE COUNTY, WISCONSIN,
December, 1852.

SIR: This is comparatively a new country; it is only some six years ago that the first settlement was made here, and even now not one acre in twenty of the tillable land of the county has been touched by the plough. But it is fast filling up with a good, enterprising population, and soon *we*, too, shall help to glut the already-overstocked markets of the East. The soil and climate of this portion of Wisconsin are well adapted to the growth of wheat, corn, oats, potatoes, barley, rye, root crops, and fruit. Our winters are too open to render winter wheat a sure crop; and, consequently, we raise but little, although its culture is not altogether abandoned. If we could secure it from winter-killing it would be a profitable crop, and would take the place of spring wheat,

which is now extensively raised. Corn, however, is what our land likes, and its culture is on the increase. Our chief fault in raising this crop is, that we do not plough *deep* enough, four inches being about an average. The average yield of corn per acre is about forty bushels, although in many instances it is far more than that. It is the common custom to feed corn to hogs and cattle in the ear, there being no cash market for it; pork and beef will always bring money at some price. At home, beef is worth three dollars and pork four dollars per hundred at the present time. The disadvantage of being at a great distance from the consumer is keenly felt by the farmers in this part. The extra price we have to pay for all kinds of manufactured articles, and the low prices which we receive for our products, tend to keep the spirits, as well as the purses, of our agricultural population rather low. Our land is rich enough, and our disposition to work good enough, and seems to warrant us a better support. Although we need to improve much in many branches of farming, yet we need a home market for our products still more.

Sheep and *Wool*.—These might be made to pay well, but the absence of the stock to begin with proves a "damper." We are all too poor to go five hundred miles away to get flocks of sheep, and bring them home, and so engage in that pursuit which comes most handy for us to do, viz: raise corn, wheat, oats, and potatoes, without regard to profit.

Fruit Culture.—We cannot say that this is receiving *increased* attention, for it has heretofore received no attention at all. We have crab apples, wild plums, wild cherries, currants, gooseberries, raspberries, strawberries, cranberries, whortleberries, wild grapes, &c., all spontaneous productions of the country, which go to show plainly what might be done at fruit-raising. Very many of our settlers are becoming convinced of the importance of trying to raise fruit trees, and there is no doubt that in a few years we shall see large numbers of trees planted, both in orchard and nursery.

Meteorology.—By a comparison of the range of thermometer here with the same in Western New York, we find that the average temperature for the last six months has been a trifle higher here than at the latter place—a fact worth considering by those who desire to emigrate and think that Northern Wisconsin is too cold a climate, since it is certainly the most healthy region in the Western country.

Yours, respectfully,

H. B. EVEREST.

Hon. S. H. Hodges.

Berlin, Marquette County, Wis.,
January 5, 1853.

Sir: I have the honor to acknowledge the receipt of your Circular; and, in reply, submit a few observations on the culture and management of flax.

The large sums which we remit annually to Europe, especially to Ireland, for linen, form a considerable item in the out-going capital of this country: whereas a concentrated and well directed exertion on the part of a few capitalists would not only establish a home manufac-

ture of linen, and thereby retain the money at home, but also encourage the production of a crop which, in Ireland, generally pays better than any other.

The chief obstacle in the way of the cultivation of flax in this country is the want of manufactories. Some cultivate the plant for the seed alone, leaving the fibre to waste, or to go to the paper-maker for a trifle. When the fibre is properly managed, it should be worth at least three times as much as the seed.

To prepare the ground for flax, it is necessary to plough it in the fall, and harrow as soon as it is sufficiently dry in the spring. Sow the seed and harrow lightly, and, if the land is flat, run the plough from head to foot of the field at every twelve feet or so; water-furrow, to draw off the superabundant moisture. Some prefer to water furrow before sowing and finishing.

As soon as the flax is four or five inches high, all weeds should be carefully pulled up. This is all that is necessary till the crop is ripe. It should then be pulled and tied up in bundles, and set up to dry preparatory to stacking. The steeping, and all after-management of the crop to prepare it for linen, would be uninteresting, as we have few factories, and therefore little inducement to attend to it.

Last spring I sowed a small plot of new ground with flax, as an experiment. I had taken rutabagas off the plot the previous fall. I did not plough the ground, it being very clean and mellow. I merely dragged it well and raked off all roots and weeds, and though the seed was very inferior, and the ground unploughed, I had a very fair sample of flax. This spring I intend to sow all the seed I have raised, which is very good, and have no doubt of a good crop.

I have the honor to be, sir, sincerely,

ALEX'R ORR McGOWAN.

JOHNSTOWN, ROCK COUNTY, WIS.,
January 17, 1853.

SIR: At your request, received a short time since, I forward my experience in cheese and butter making on the prairies of the West. I find the prairie grass well adapted to making them both for a small portion of the year—say the summer months—and the flavor and richness of each are not excelled even by the best of tame grasses. The only difficulty is in the shortness of time that the prairie-grass is available. It starts late in the spring. There is not, generally, a full bite until near the 1st of June; then it grows very rapid. By the 1st of September it becomes tough and unpalatable, and, after one or two slight frosts, worthless.

I milked the past season thirty-five cows. Have been in the dairy business for the last seven years on the same farm. My cows have not been allowed to run at large, as many are in this section; but have been kept in a pasture that is one half seeded with Timothy and clover; the remainder is native grass; though I have increased my tame pasture of late, and find my butter and cheese increasing something in proportion. Not that I can make a larger cheese from the same cows in the month of June or July; but that my cows will give a larger quantity before the month of June, and a *much* larger quantity after the month of

August, for reasons given above. It is a mistaken idea of the people of the Eastern and Middle States that the prairie soil is not adapted to the tame grasses. I have seen no country yield heavier burdens of Timothy and clover hay (the large New York clover) than rock prairie. I have mown one piece of this variety for five seasons in succession. It has cut over two tons of hay to the acre, and I doubt not but that some years it has cut three; and no kind of fertilizers have been used on it. Average yearly produce of cheese per cow, made from pasture above described, without grain or slop, three hundred and fifty pounds.

Treatment of the Milk.—Strained at night into a tin vat, surrounded with water and ice, by placing the vat inside of a larger wooden vat, and stirring until the temperature sinks to fifty degrees. In the morning skim the cream from the milk; add to it an equal quantity of milk from the cow, and raise the temperature to one hundred degrees by adding hot water. Stir until the cream is perfectly limpid; then mix it well with the milk in the vat immediately before adding the rennet. Warm the night's milk by passing steam into the water in the wooden vat. When at the temperature of ninety degrees, add rennet sufficient to curdle it in forty minutes. The morning's milk, when taken from the cow, is strained with the evening's, and one cheese is made from the two milkings. I copy from my memorandum table of 1851. Milked twenty-five cows that season.

Time made.	Number of gallons of milk.	Heat of milk at setting.	Time of curding, in minutes.	Time of breaking, in minutes.	Time of heating, in minutes.	Scalding heat.	Time scalded, in minutes.	Number of tea-cups of salt.	Quality of curd.	Quality of cheese at sixty days old.	Pressed weight of cheese, green.	Weight of cheese at sixty days old.
1851.		*Deg.*				*Deg.*					*Lbs.*	*Lbs.*
June [illegible]	76	86	75	30	35	102	50	5	Sweet and fine.	Mild and soft.	62	58
June 2[illegible]	66	86	70	35	30	104	40	6	Sweet and fine.	Mild and little dry.	60	57
July 1	65	90	60	30	35	103	55	6	Extra fine.....	Good	66	61
July 5	63	88	50	50	30	104	40	6	Extra sweet & fine.	Mild and good	69	62

Average price of cheese, 7 cents at sixty days old. For further information in reference to the appearance and quality of cheese, I refer you to the Wisconsin State Agricultural Society.

Very respectfully, yours,

F. S. ELDRED.

PLATTEVILLE, GRANT COUNTY, WISCONSIN,
December 4, 1852.

SIR: Some time last year I received a Circular from your Office making certain inquiries, which at the time I thought but little of, being myself but a small farmer, and deeming others more capable of giving the information desired; but in reading the Report of the Commissioner

of Patents, I find you had not received a response from this county, (the Upper Mississippi lead mines,) and feel it to be a duty, however incompetent, to answer your Circular.

Wheat.—For some years fall wheat has been winter-killed so often as to discourage our farmers from attempting to raise it to any considerable extent; when it lives through the winter, the crop is generally good, yielding sometimes as high as forty bushels to the acre; but this is much above an average—perhaps one-half; the price is about 65 cents. The varieties mostly in use are the Red-chaff bearded and White bald; the latter has so far stood the winter best. Our main dependence is, and has been for some time, spring wheat; the varieties most popular are the Italian and Red River; the Black Sea makes the best crop; but our millers have not thus far been able to make a good article of flour from it; the price of the first two is about 50 cents, the latter something less. Our best crop is made by sowing on new prairie sod and harrowing it over several times; spring wheat produces from ten to thirty-five bushels to the acre.

Oats are one of our best crops, yielding, with but little labor, from 40 to 60 bushels to the acre; the best plan is to plough the land in the fall, and sow the oats (about three bushels to the acre) in the spring, and harrow the ground sufficient to cover the seed; they are hardly worth raising, as they usually sell for about 15 cents a bushel, with no great demand at that price.

Barley is a first-rate crop with us if we had a market for it; it is raised as easily as oats, the crop about thirty bushels; but the price this season has been from 20 to 25 cents; it is not so good a crop as oats.

Corn is with us one of the principal crops; we raise usually about forty bushels per acre, though I have seen whole crops go as high as sixty or more; the price is now 25 cents.

Flax-seed will in a short time be a large crop; from three crops made this season, (and it is an unusually dry one,) I believe it can be raised to better advantage than perhaps anything else; the three crops, taken together, averaged about thirteen bushels to the acre, worth about 90 cents, with an expense far less than either wheat or corn; and when the flax itself is worth anything, which is not the case now, the crop will be worth that much more.

Potatoes had till lately almost ceased to be a crop, though one of our best crops till the rot commenced. It is now disappearing to some extent, though it has left us without the Meshannock, (our best variety,) and the principal one till the rot commenced.

Hay.—Till lately we depended on the native grass for our supply of this article; but our farmers have commenced the cultivation of Timothy and clover, both of which do well, yielding from one to three tons per acre.

Manures.—You are aware that this is a new country, and, though nominally settled some twenty-odd years, it was first overrun with miners, who, instead of cultivating the land, rendered it so far as they did anything, unfit for cultivation by digging it up; the cultivation commenced about twelve years ago, and our soil, being of the best quality, has heretofore needed but little manure. The English farmers—and we have many of them here—haul out all their barn-yard manure every fall and throw it in heaps on their ground, scatter it in the spring, and plough it

under; they raise the best crops of any in the country, to my knowledge; no other manure has been used in this county.

We have one of the finest countries in the world; and were it cultivated as it might, and as I hope it soon will be, and were manufactories established on many of our thousand water-powers, as good as the sun shines on, making a market for the immense surplus we are capable of producing, ours would certainly be one of the most desirable locations in the world.

I will conclude by subscribing myself yours, &c.,

JAMES DURLEY.

To the COMMISSIONER OF PATENTS.

KOSSUTH, KENOSHA COUNTY, WISCONSIN,
December 16, 1852.

SIR: Your Agricultural Circular came duly to hand.

Wheat.—Wheat culture has been a very precarious business, either in winter or spring, for a number of years past. The most careful preparation by summer fallow is often so much labor lost. It was formerly our staple crop, when large crops of the best winter wheat were raised with a small outlay of skill or labor. As winter wheat began to fail, recourse was had to spring wheat, which yielded good crops, and of an excellent quality, at first; in a few years it deteriorated in quality and quantity so much that Wisconsin wheat rated the lowest wherever it found a market. Continual cropping is one great cause of this result—a result which has driven the agriculturist, in this section, to commence a different system of farming. White-flint, Canada flint, and the Mediteranean, are the favorite kinds cultivated here, though to a limited extent. The Mediteranean is considered the least hazardous, and most exempt from the insect and blight; twenty bushels per acre are considered a fair yield.

Corn is becoming a favorite crop, converted into pork, and yields a profitable return. The favorite kind is the Yellow Dent, which matures, in ordinary seasons, to the greatest perfection. A very productive method is, to take a piece of stubble-ground, as soon after harvest as convenient, put on a good coat of barn-yard manure, plough it under, (the earlier the better,) let it lie till spring, and harrow it thoroughly just before planting. Four feet each way is the distance for Dent corn, with but three stalks in a hill.

Tobacco has been cultivated in this county with good success, in small patches; yield from ten to twenty hundred weight per acre. Connecticut seed leaf and Cuba principally cultivated; price, in Kenosha, from five to fifteen cents per pound.

Potatoes yield well, and of an excellent quality; owing, perhaps, to an extreme dry season; not a symptom of the disease observable; yield from one hundred to one hundred and fifty bushels per acre. Ground that has produced but one crop after the first breaking is the best for potatoes without any manure, as manure is considered a promoter of the disease, with the exception of lime or ashes, which operate as preventives.

Fruit culture is receiving increased attention. Fruit trees, generally, do not come into early bearing, especially those in cultivation; they make a rapid and great growth of wood. Some apple-orchards have,

within a year or two, been attacked with the bark-louse, to the great detriment of the trees. I think there is a remedy for it. I have about two hundred apple trees, to which I give a thorough washing, spring and fall, of the following mixture: four quarts of soft soap, one pound of sulphur, two quarts of common ashes, and six quarts of water, with a broom; wash the body and limbs as high as convenient. I also put in the spring about two quarts of unleached or one peck of leached ashes around the roots of the trees. No insect will live in alkali. My trees are exempt from this insect.

Some attention is being paid to the culture of flax, but, as yet, to a limited extent; and should there become a reliable market for the fibre, the culture would be greatly extended, but not otherwise.

Respectfully, yours,

PHILANDER JUDSON.

Hon. Silas H. Hodges,
Commissioner of Patents.

Ceresco, Fond du Lac County, Wisconsin,
November 18, 1852.

Sir: Your Circular came to hand some weeks since, and in reply I forward my gleanings of agricultural knowledge from our district of country bordering the Upper Fox river, better known to travellers as the Green Lake country. The counties of Columbia, Dodge, Marquette, and the south half of Winnebago and west half of Fond du Lac, comprise my range of observations; this district is about equally divided between prairie and openings; the latter of burr, yellow and white oak, with occasional groves of timber bordering our lakes, streams, and springs, which abundantly water our district. Our soil rests upon the cliff limestone, which is occasionally broken by the out-cropping Potsdam sandstone. The soil is both silicious and argillacious, some places abounding in one, and more in the other, and is as well adapted to the production of the cereals as any portion of the Northern States. Our agricultural settlement commenced about 1840, and hence most of our soil is still unbroken, and all contains much of its virgin vigor. Our leading efforts have been the production of wheat. Two or three favorable winters, followed by abundant harvests of winter wheat, led to extensive fall sowing of this grain, without much regard to time of sowing or peculiarity of kind of seed; this was followed by successive failures—total on the prairies, and partially in the openings, owing to our cold, dry winters, almost without snow, as a majority have been for ten years past. If we had a variety of winter wheat, that would live through our winters, we could produce it in abundance, and with as little labor as any other wheat district of our country. Perhaps the Mediterranean would succeed. It has not been tried to my knowledge. These failures have changed our leading crops to spring wheat and maize; spring wheat yields abundantly of the several varieties. The Hedge Row was most common, but has died out with a disease which our farmers call a rot in the berry, and is succeeded by Black Sea, Canada Club, Red River, and Dent; of which the first yields best, second and third make best flour, and fourth is least known and least esteemed. Our prices this fall range, at our markets, for winter wheat, from 50 to 60 cents; for good spring wheat, from 40 to

50 cents. No kinds of manures are yet used for wheat crops. The fly and weevil have not yet troubled us. On new soil our farmers usually raise two or three crops of wheat in succession; then alternate with oats or maize, or fallow with weeds; spring wheat yields to average about twenty-five bushels per acre; plough but once, and about six inches deep. But little skill or science has yet been applied to our agriculture; like the early settlers of most districts of our country our farmers are deficient in that science and economy which will be much more needed by our successors, but which could be used to great advantage now. In the production of corn our farmers began very moderately, fearing the seasons would not allow of its ripening; we were disappointed; it has never failed to yield a good harvest, and its culture has steadily increased, until the last season has carried it in advance of any other crop; and many believe it is to be the leading grain of our district. Barn-yard manure is usually bestowed on the corn ground, and improves the crop very much, although few farmers would take the trouble to remove it were it not in their way; no other manures are used. Our farmers estimate the cost of production at from 10 to 15 cents per bushel; it brings on the ear from 25 to 35 cents per bushel. There is scarcely a field of unmixed variety to be found in our district; the Dent, or a mixture nearly approaching it, prevails; some, however, keep nearer the white and yellow eight-rowed varieties. We plant from the 10th of May to the 10th of June; plough out once, and slightly hoe; forty bushels per acre are called an average crop; it is principally fed raw and on the ear, or ground with oats and carried to our neighboring pineries on the Wolf and Wisconsin rivers, and fed to oxen during the logging seasons. Oats, as a crop, rank third in our district; they yield abundantly; cost of production from 5 to 10 cents per bushel, and sell from 15 to 25 cents; they are considered more exhausting to the soil than any other crop. Our farmers have heretofore confined their efforts mostly to these three great staples. The winter wheat failures have, however, turned the attention of many to other products, of which wool, horses, and cattle are most important. Barley yields well, but is little raised. Beans yield abundantly, and the crop is yearly increasing; they sell for $1 per bushel; cost about 25 cents. Peas yield well, but are less raised than any of the foregoing, and rye less still; the latter is used more for grazing sheep, but little as a crop. Of grasses, clover and Timothy do well on our lowlands, but on our prairies and uplands kill badly, during our cold, dry winters. We have not yet succeeded in finding the kinds properly adapted to our district; we depend on the native wild hay, which is yet abundant, and can be furnished in the hay season for from $2 to $4 per ton in the stack. Our dairy husbandry is very limited, but steadily increasing; many cows during the grazing season, on our wild grass and no other feed, yield one hundred pounds of butter each, which usually sells at from 10 to 16 cents per pound. Cheese sells at 8 and 10 cents; and the home demand is, as yet, barely supplied. Our district is well adapted to dairy business and stock-raising. Our climate is well adapted to packing and keeping both of butter and cheese; good dairy cows are worth $25; three-year old cattle, $15. We have not yet raised a supply for our increasing immigration; and we are supplied from the southern part of our State and Illinois. Little attention has yet been paid to breeds. Horses are easily raised; but prices are high, and the demand greater than the supply.

Considerable attention has been turned to the raising of flax for two years past; the crop yields well, but no use is yet made of the straw. Sheep and wool-growing are becoming of much importance in our district; thus far the experiments indicate that it will be our most important branch of husbandry; I am, however, not able to give accurate results of experiments.

Hogs are profitable, but not abundant; they live in summer without feed; are shut up in fall and fed; eight bushels of corn, cost $2 40 (if bought) make one hundred pounds pork, which sells at $5 per cwt. There is little trouble in keeping bacon and hams in our climate.

No *tobacco* or *hemp* is raised here. The root crops yield abundantly, but are but little raised, except potatoes, which have rotted for several years until this season, when the rot has entirely disappeared, and the crop, although small, has come in of excellent quality and abundant, in proportion to the number of acres planted. But little care or skill is devoted to raising this or any other root crop.

Of *fruit* we can only say that our thermometer showed each winter occasional days when the mercury went down to 0°; and once in ten years to 36° below zero; and hence our peach trees kill in winter. Apple, pear, cherry, and plum trees grow thriftily; and many young orchards are to be seen, but few are yet at the age of bearing.

Lime abounds in our soil and in our rock; no gypsum is used as a manure.

Respectfully, yours,

WARREN CHASE.

To the Commissioner of Patents.

Near Fort Madison, Iowa,
December 27, 1852.

Sir: I received your Circular some time since, but, owing to a press of business in consequence of the winter setting in earlier than usual, and endeavoring to collect information from the farmers in this neighborhood, so as to make out a correct statement of the highest and lowest yield per acre, I have been unable to answer it until now.

The following statements I have collected from brother farmers, and we have agreed upon the facts therein stated, with a few exceptions, where I have given my own opinion:

Wheat.—No guano used here. The average product this year is eleven bushels per acre. Time of seeding, from 1st to the last of September; time of harvesting, from the 6th to the 18th of July. Preparation of seed: This is not much attended to. I prepare by steeping in a strong brine, then rolling in lime, with good results. We sow from one bushel to one and a half per acre. We use wheat stubble, oat stubble, fallows, and corn-ground. Stubble is best ploughed twice—the last ploughing the deepest; then harrow well in. There is no rotation of crops that is particularly in use here. Late sowing, pasturing close, and rolling in the fall, or the above mode of preparing the seed, are the only remedies we know of for the Hessian fly. The yield is diminishing; price, from 50 to 60 cents per bushel. There is not often grass seed sown with wheat; but when there is, Timothy is used, with a mixture of red clover.

Corn.—Average product per acre, forty bushels; cost of production per bushel, about 14 cents. Our best system of culture is to plough the ground in the fall, plant early, harrow with a two horse harrow, run the harrow over the rows when the corn is small, then plough three times; but other farmers have different modes. For feed it is best to grind corn and cob together, and no doubt if cooked it would be still better; but it is not done here. It is nearly all fed without grinding. Plant rows about four feet distant, crossed the same distance; not more than three to five stalks in the hill.

Oats.—Average yield per acre, about thirty three bushels. *Barley*, spring, from ten to thirty three bushels per acre; two bushels of oats and about the same of spring barley are sown per acre. Fall barley not much cultivated. Barley is the least exhausting crop, and a good crop to precede wheat. *Rye*, *peas*, and *beans* not much cultivated here.

Clover and *Grasses.*—Quantity of hay per acre, about two tons. Best fertilizer, barn yard manure, and the only fertilizer used here for meadows and pastures. Timothy and red-clover are the only seeds used in laying down meadows; quantity sown, ten quarts per acre. Cost of growing hay, $2 50 per ton. We have never known red clover to injure horses.

Dairy Husbandry.—Average yearly produce per cow, one hundred pounds of butter, or two hundred of cheese; comparative cost per pound, butter probably one third more than cheese. As to the treatment of milk and cream, there are different modes in use; and I cannot particularize any one, as each has its advocates. The mode of churning is the old fashioned churn, generally. Butter is put down in stone jars for market as the best method. Price of butter, from 8 to 20 cents per pound; cheese, 7 cents per pound.

Neat Cattle.—Cost of rearing until three years old, $7; usual price at that age, from $10 to $15. Cows sell in the spring from $16 to $20; in the fall, from $14 to $18. As to the pounds of beef one hundred pounds of corn will produce, I think from about eight to ten pounds would be near the amount. A given amount of food will, I am convinced, yield more meat in an improved breed; but as there are few of such breeds here, the experiment has not been tried. Steers I have seen broken with more ease to the yoke by gentle treatment than by a contrary method; and, in my opinion, the same rule will hold good with horses.

Rearing *horses* and *mules* is profitable; particularly the latter. The expense of rearing a horse is, I think, one-third more than a mule; the horse at three years old would, perhaps, cost $24 or $25; the mule $15 or $16. The horse, at that age, would be worth $50 on an average, and a good mule from $60 to $80; this difference, I think, is occasioned in whole or in part by the demand created for them by the emigration to California. Brood mares, if worked at all, should be moderately used; they should run in pasture and be fed, in winter corn, and in summer, oats, in addition to their grass and hay. Colts: Our practice here is to feed sparingly until two years old. It is the opinion of many intelligent farmers that the big head and stiff complaints so prevalent among horses here are caused by feeding so much on corn without any change, summer or winter. Gentle treatment, in my opinion, is the best way to break either horse or mule.

Sheep and *Wool*.—Sheep are but little raised in this neighborhood, each family keeping only enough for home use. Some, that five or six years ago had flocks of sheep, found that it was not profitable, and have sold out. There is a sheep farm in the northwest corner of this county, but I am unable to give any definite answer to your inquiries.

Hogs.—The best breed is a mixture of the China with the Byfield, Irish Grazer, or some other large breed. The Berkshire is out of repute here. Our only method of producing pork is by feeding corn in the ear. No doubt that corn ground, or ground and cooked, would be much more economical; but the experiment has not been made. It is the opinion of a number of farmers that I have consulted, that one hundred pounds of corn, fed in the usual manner, will yield from sixteen to twenty pounds of pork.

Our merchants salt the middlings in bulk—that is, piled up on the floor of the warehouse. There are various modes of curing bacon. I can only say that I have made good bacon by salting in a hogshead; the hams and shoulders undermost, so as to be covered with pickle. After two or three days, draw the meat, boil and skim the pickle, and salt down again in the same manner. After remaining until properly salted—say six weeks—take up, hang, smoke with green hickory wood, and canvas.

Tobacco but little raised—and that used only by smokers. *Hemp* only raised for home use. *Turnips* grow very large on our upland prairies, but are not much raised. *Carrots*, *beets*, &c., only raised in gardens for family use.

Potatoes.—On upland prairies potatoes were badly used up by the rot this year. There was a bug that destroyed the vines in June or July, and the destruction of the potato followed; for which we have discovered no remedy. Meshanock is the best potato we have. Sweet potatoes do well here, and are raised in considerable quantities for home consumption.

Fruit culture is receiving increased attention; and I believe that apples will be, and are, a profitable crop. At present our orchards are just commencing to bear, so that I cannot answer you more fully. There is no remedy that I know of for the blight or yellows. The borer is the worst enemy our apple trees have; for which I know of no remedy, only to examine the trees closely often during the summer, and cut them out.

Manure.—The stable manure is all that has been tried here, and its effects are surprising on grass and other crops on our new prairies.

I have now endeavored to answer your inquiries as briefly as possible; but, as we have an agricultural society in the southern part of our county, and an agricultural periodical printed there, also in Keokuk, I hope they will give you more information than I can.

I am, sir, respectfully, yours, &c.,

DANIEL McCREADY.

Abstract of Meteorological Observations made near Fort Madison, Lee county, Iowa, for the year 1852.

Date.	Monthly mean.	Highest temperature.	Time of the highest temperature.	Lowest temperature.	Time of the lowest temperature.	Range.	Quantity of rain.	Quantity of snow.	Prevailing course of wind.	Days on which rain or snow fell.
	°	°	*Noon.*	°	*Sunrise.*	°	*Inches.*	*Inches.*		
January.....	22.96	56	28th.....	22	19th....	78	1.45	4.70	NW. & SW.....	4, 6, 7, 8, 9, 10, 14, 15, 16, 17, 20, 21, 25, 30, and 31.
February....	33.05	54	3d & 4th .	8	29th....	46	15	.....	NW. & SW.....	5, 21, and 29. (Roads dry and dusty this month.)
March.....	41.08	80	25th	4	19th....	76	8.05	1.00	NW.,SW ,& SE.	1, 3, 4, 8, 11, 13, 16, 20, 25, 28, 29, and 31.
April.....	46.48	79	30th.....	21	2d.....	28	2.85	4.75	NW. & SW.....	2, 3, 4, 5, 6, 7, 9, 10, 16, 17, 20, 23, and 24.
May.....	62.32	88	29th.....	30	20th....	56	6.85	.....	NW. & SE.....	2, 7, 6. 5, 10, 11, 12, 13, 18, 21, 22, and 25.
June.....	69.13	94	30th.....	42	5th....	52	4.97	.....	NW.....	2, 3, 7, 16, 17, 23, 27, and 30.
July...	74.93	99	18th&29th	48	2d.....	51	2.60	.....	NW ,SW., & SE.	7, 5, 8 10, and 23.
August.....	72 96	97	24th.....	48	11 & 28	49	3.10	.....	SE. & NW.....	14, 19, and 22.
September...	65.07	94	1st	38	26th....	56	6.55	.....	.....	1, 10, 13, 17, 19, 20. 23, 24, 25, and 30.
October.....	57.50	83	7th...	30	12th....	53	6.40	.....	SE. & NW.....	1, 2, 3, 5, 8, 9, 11, 13, 25, 26, 27, and 28.
November...	33.54	54	1st.....	9	19th....	45	6.40	21.25	NW. & SE.....	1, 3, 4, 5, 10, 11, 13, 15, 20, 21, and 25.
December...	27.70	53	2d.....	0	13th....	53	1.80	6.00	NW. & SE.....	2, 3, 8, 11, 20, 22, 23, 25, 26, and 30.
Yearly mean.	50.56		Total rain and snow.....				51.17	37.70		

N. B. If rain fell in the night, it is given as the day before.

Respectfully,

DANIEL McCREADY

To the Commissioner of Patents.

LE CLAIRE, SCOTT COUNTY, IOWA,
November 16, 1852.

SIR: By the kind remembrance of Hon. A. C. Dodge, senator in Congress from this State, I have been furnished your Circular of August last, asking information with regard to the agricultural products of this section of the country. Notwithstanding my knowledge of agriculture is somewhat limited, I have concluded to send in my *mite* from this newly-settled, but productive and rapidly-improving portion of the Great West.

I have read all the Reports from your Office from 1847 down to the present time with great care and attention, and I rejoice in the means afforded by them of disseminating such valuable information over our widely-extended Republic.

Owing to the fertility of our prairie soil, manures of any kind have not been used by any of our farmers in this section of Iowa. The crops mostly raised here are wheat, corn, oats, barley, potatoes, and onions.

Wheat.—Owing to the cold, dry, windy weather in the winter, fall wheat is not raised to any extent, but very fine spring wheat, of the Red River and Italian varieties, and what is called Hedge Row, is extensively raised. It is sown in April and harvested in July. Before sowing, the ground is ploughed about four inches deep and then harrowed well, when one and a half bushel of seed per acre is sown, and again harrowed; the yield is from fifteen to twenty bushels an acre. The Hessian flies and weevils are unknown to the wheat raised here; nothing troubles wheat in this country but *smut*, which may be prevented by washing the seed in vitriol water before sowing. The price of wheat this year is from fifty to sixty-five cents per bushel.

Corn.—Several varieties of Indian corn are raised in Scott, Clinton, and the adjoining counties of Iowa; the most common, however, is the Yellow Dent. One man with a team will cultivate about thirty acres; it is planted in May and ploughed three or four times, and ought to be hoed once or twice; common yield from fifty to seventy-five bushels per acre. The ground is well ploughed up before planting, and the rows from three and a half to four feet apart, and four stalks left in a hill.

Oats, *barley*, *rye*, *peas*, and *beans* are successful crops here; the yield, however, depends upon the season.

Clover and *Timothy* grow well wherever tried, but, in consequence of the abundance of prairie hay, little attention has yet been paid to their cultivation.

Butter and *cheese* made in abundance, and quite profitable. I am, however, but little acquainted with the dairy business.

Horses are raised with but little trouble and expense, and at three years old will sell for from seventy-five to one hundred dollars.

Sheep and *wool-growing* will undoubtedly be the most profitable business in Iowa, as they seem to do remarkably well, and can be raised with very little expense. I am sorry to say that but few sheep have yet been introduced into the country.

Hogs are raised here extensively, and pork sells at from four to five dollars per hundred weight.

Potatoes.—Irish potatoes of the best quality are raised here in great abundance; they produce from two hundred and fifty to three hundred

bushels per acre, and are selling this season at twenty-five cents per bushel. *Sweet potatoes* grow well here, but are not much raised.

Fruit Culture.—Apples, pears, cherries, plums, and grapes do well; the peach is uncertain.

I regret that I have been unable to answer your questions more fully, and also to give you some other information, as I intended.

Very respectfully,

LAUREL SUMMERS.

To the COMMISSIONER OF PATENTS.

KANESVILLE, (COUNCIL BLUFF) IOWA,
October 23, 1852.

SIR: Pursuant to request by your Circular of interrogatories, I hasten to reply, and will briefly state, in answer, so far as my knowledge and experience extend, in regard to the subjects of which you wish information.

Wheat is produced through this section of country without the aid of any kind of manures. Much of the crops are put in with but once ploughing of 4 to 6 inches deep, and the wheat covered by dragging the ground. The better crops are produced by sowing in September amongst the standing corn; the stalks being left standing through the winter are cut down and raked off in the spring. A number of crops are frequently produced successively from one piece of ground, without any perceptible diminution in the succeeding crops.

There is no insect that disturbs the crop here.

The best crops are produced where the northwesterly winds are broken from the fields. As the snows are light and lay on the ground but a short time, a great advantage may be derived in this Western country by sowing early with oats where the land is open. These will protect the wheat through the winter from wind, and also from destruction by frost and heat.

The general average of winter wheat in this county is about 25 bushels per acre, and brings, at this time, 75 cents per bushel. August and September are the time for seeding, and July the harvest month.

Corn is abundantly produced without the assistance of manures. Sixty bushels per acre is considered an average yield; and 10 cents per bushel is near the cost of raising. Average price in our place is 20 cents per bushel.

Oats are a good crop here, and yield well—say 50 to 55 bushels per acre. *Peas* and *barley* are not raised to any extent. *Beans* are easily produced, and will average per acre—say 20 bushels; bringing in our market from $2 to $3 per bushel. *Oats* average 30 cents per bushel.

Clover and *grasses* are not as yet cultivated, the country being but lately settled.

Stock growing.—There is no county within my knowledge better adapted to grazing than this. Upon all the streams large beds of rushes are found, where stock will fatten all winter, only requiring herding. Then in the summer our broad prairies produce an abundance of fine rich grass, which will fatten stock much quicker than the tame grasses.

The cost, therefore, of rearing is comparatively nothing. The average price at 3 years old will be $12 per head.

Wool-growing at present is very limited, but would be exceedingly profitable, as the increase of the stock would pay the yearly expense of the flock.

Hogs are raised with very little trouble, and the climate is particularly adapted to their increase; nuts and roots abounding in the forests and on the prairies, to sustain them. Very little corn is fed them until they come to fattening.

Root Crops.—Turnips, carrots, beets, parsnips, &c., are not at present cultivated as field crops, but grow in boundless and unlimited profusion provided the ground is furnished with seed. Melons, pumpkins, and cabbage also grow abundantly, and to perfection; the two former only requiring to be planted on sod ground, with or without corn, and many wagon-loads per acre may be grown without further trouble. Molasses produced from the watermelon is considered equal to honey.

Potatoes —Both Irish and sweet are produced in abundance. The former will produce, if well attended, 300 bushels per acre, at a cost, before harvesting, of about 5 cents per bushel, or less; average market price .30 cents per bushel. The Pink-eye, large Red Meshanock, the Irish Gray, Blue Kidney, and large Orange, are considered the best varieties.

Fruit.—As yet, few or no orchards exist in this county, or immediately in this vicinity, except a few small orchards and nurseries. This is doubtless an excellent fruit country. A few very fine peaches have been produced from the seed since settling here. Fruit would be an exceedingly profitable crop, as apples bring from $1 50 to $2 per bushel; and this county will ere long become one of the finest fruit counties in the West.

Your most obedient servant,

J. E. JOHNSON.

To the COMMISSIONER.

JEFFERSON COUNTY, IOWA,
November 12, 1852.

SIR: I acknowledge the receipt of your Circular of inquiries relating to the farming interests. Particularly confining myself to this vicinity, I proceed to answer such of your queries as have fallen under my observation and experience.

Wheat.—Varieties in use, Red-chaff bearded, Golden-chaff, and Red-chaff smooth, and Early May. The Mediterranean does not stand the winter so well as the other kinds; the first mentioned most in use. We are somewhat troubled with the Hessian fly and the rust, and often injured by the severity of the winter. There is little or no snow, and occasional thaws, and then on a sudden the thermometer sinks from eighteen to twenty and twenty two degrees below zero, which kills more or less root and top. Time and method: some sown on sod broken up in June or July; it is also sown on oat-stubble, and mostly among corn; time, from the last week in August till the middle of September; average yield, from eight to twelve bushels per acre; price, fifty cents per bushel.

Spring wheat is considerably sown; yet it is somewhat uncertain, in

consequence of an insect known by the name of the chintz fly. It attacks the lower extremity of the stalk, taking all the sap from the head, or not leaving enough to mature the berry perfect and plump, it being more or less shrunk; this is invariably the case if late sown. The best preventive that I have found is, break up the ground in the fall, then take from fifty to eighty bushels of air-slacked lime and a light coat of stable manure, spread them evenly over the surface; this is done before the frost; and then let it lie until February or March, as the going out of the frost will admit of a loose soil to operate with a drill or harrow—the former preferable. Put two bushels of seed to the acre and you generally have a plump berry, free from the insects, and from ten to thirty bushels per acre. Several kinds in use; but the Italian is the best adapted to our soil and clime, in consequence of its early maturity.

Rye is not largely cultivated; it is generally sown in September; yet some sow in August for the purpose of pasture. It is a sure crop; yield, from fifteen to twenty bushels per acre; price, from fifty to seventy-five cents per bushel.

Oats are largely cultivated; common time of sowing, March, April, and May; one and a half to two bushels and a half per acre; yield from thirty to fifty bushels per acre; price, fifteen to twenty-five cents per bushel.

Corn.—This great staple is of the first importance with us; it affords a cheap and wholesome bread, and supports our stock of all kinds, which are our only source of making anything in the surplus-money line. We have two kinds in common use—the yellow and white gourd-seed; the yellow being the hardiest and earliest, and considered the most heating and strong; the white possessing more of the saccharine, and when distilled will not produce so much liquor to the bushel as the yellow. I prefer the white to feed to horses; the yellow, for all other kinds of stock. The method of putting in: plough in the fall, harrow in the spring, list or furrow out in the usual way, four feet apart; put from three to four grains in a hill. Time of planting, from the last of April to the 1st of June—the best time from the 1st of May to the 15th. Yield in bushels, from forty to seventy-five per acre; price, from ten to fifty cents per bushel.

Yours, respectfully,

ENOS ELLMAKER.

To the COMMISSIONER OF PATENTS.

KNOXVILLE, MARION COUNTY, IOWA,
October 26, 1852.

SIR: Agreeably to your request, coming though an Agricultural Circular of August, 1852, we have the pleasure of answering you, so far as we are able, in relation to some of your interrogatories; but as we reside in a new State, and in a county that has not been organized more than six years, we must be pardoned and it must be excused should it fall behind older ones.

Wheat.—In relation to guano, we must say that even stable-manure is not used, as there appears to be enough of richness or productive-

ness in the soil to satisfy the agriculturist without resorting to the use of manure of any kind whatever. In relation to the productiveness of wheat, we think that twenty bushels may be reckoned an average crop; though we think more might be raised, as the soil is new, and there is not proper care and labor bestowed by the husbandman in the cultivation of wheat, so as to produce as much as the richness of the soil will admit. The usual time of seeding is from the 15th of August until the 20th of September. The amount of seed is from three pecks to one and a half bushel. Those who sow early use the smaller quantity, and those who sow later the greater quantity. Time of harvesting, about the first week in July. Plough but once. As we before stated, the husbandmen here are not yet sufficiently enterprising to cultivate the soil by more than one ploughing. The yield is increasing, and we think will increase as the country grows older. Price, about fifty cents per bushel. There have never been any flies or weevils here. Timothy is the only grass sown here with wheat.

No manure used for corn. Corn is the principal crop raised here. Average product per acre, about sixty bushels; cost of production, about three dollars per acre. We have no hesitation in saying that, by having the corn ground, it will gain twenty-five per cent. over corn fed raw. The ground is prepared by ploughing, in the month of April or May, and then listing the ground out, having the rows about three and a half feet apart, and cross-listing or furrowing out and planting the hill where the furrows cross, so as to permit the corn to be cultivated by ploughing the rows both ways.

Oats.—Oats are very productive here; and the most inconvenience in relation to this crop is, that, owing to the newness and richness of the soil, they are very subject to fall down or lodge. Quantity of seed used, from two to three bushels.

Rye, *peas*, *beans*, and *barley* not cultivated to any extent.

Clover and *Grasses.*—Clover very little cultivated here. Timothy does extremely well, owing to the richness of the soil, and grows as coarse or large in the stalk as rye; and we have measured the heads of Timothy that measured 8½ inches in length. The yield per acre is about three tons. Cost of growing Timothy, about $1 50 per ton.

Cheese.—There has been a considerable amount of cheese made in this county by a colony of Hollanders, who have done well in the business. Average price, 6¼ cents per pound. The cost is comparatively small, as cows graze upon the prairies free from the first of April until the latter part of November, the whole of the cheese-making season.

Neat Cattle.—"Cost of rearing until 3 years old:" The cost will be about $6; usual price at 3 years old, heifers, $12; steers, $20. "Value of good dairy cows in spring and fall:" spring, $16 to $20; fall, from $12 to $15.

"How do you break steers to the yoke?"—By putting the yoke upon their necks and hitching them behind an old and steady yoke of well broken oxen, and sometimes by yoking them up and tying their tails together.

Horses and *Mules.*—We think them highly profitable, from the small cost here in raising them, and the high price they command at present. The expense of rearing will be about $30.

Wool-growing is quite profitable here, as the pasture costs nothing.

The cost per pound will be about 10 cents. Large sheep are the most profitable here.

Hogs.—"What is the best breed?" A cross of the Berkshire with the largest breed.

Turnips.—Turnips do uncommonly well, better here than in any of the other States, owing to the depth and general looseness of the soil; we have weighed turnips that weighed 8 pounds.

Potatoes.—Average yield per acre, from 400 to 500 bushels; free from rot this season. Cost of production per bushel, about 5 cents. The most prolific are the Merinos or Long-red. The best varieties for family use are the Meshanocks and Pink-eyes.

The best system of planting and tillage is to plough deep, then drill out the ground about 3 feet wide, then drop your potatoes in the drilled rows and cover them with coarse manure, and then cover with earth.

We are, most respectfully, your obedient servants,

ADMIRAL B. MILLER.
JOSEPH BROBST.

RAMSEY COUNTY, MINNESOTA TERRITORY,
December 8, 1852.

SIR: Agriculture in this Territory is in its infancy. Only 3 crops have been raised. It was not until last season that the attention of more than a few individuals had been directed to the subject. My report, therefore, must be limited.

The soil of the Territory generally is a light sandy loam, underlaid with a subsoil of clay of various depths, and the whole country is interspersed with small lakes of pure water. The general fertility of the soil, like that of the West generally, is such as to induce a total neglect of manuring as yet. What manures have been applied are common stable manures, and their application has been chiefly confined to garden spots. It may be said, perhaps without exception, that the Cereals all do well. Winter wheat, however, has not yet received a fair trial. Root crops all prove very profitable. Clover, Timothy, and Blue-grass have been introduced, and promise very fair, but sufficient time has not elapsed to prove the adaptation of our soil to their culture. Wild grass is luxuriant and exceedingly nutritious.

A single instance of the culture of flax, within my knowledge, induces the conviction that our soil will produce that crop abundantly. The existence of the crab apple, plum, cherry, &c., in the wild state, warrants the belief that this will be a good fruit-growing country. Many are turning their attention to the subject, and young orchards already grace many farms.

I give below a table showing the average yield, &c., of the principal products yet tried in our soil.

Kinds of products.	Time of sowing.	Amount of seed to the acre.	Average product to the acre.	Average cost per bushel.	Average price in market.	Remarks.
Spring wheat.	April 10	1 bushel...	30 bushels	$0 35	$0 75	
Corn	May 10	5 quarts....	50 "	25	45	12-rowed white flint best adapted to this climate.
Oats*	April 10	2½ bushels..	50 "	20	35	
Barley	April 10	.....	50 "	20	35	Little raised yet.
Beans	May 15	.....	.....	60	2 00	
Sweet potatoes.	May 15	.....	.....	50	1 75	Little raised yet.
Irish potatoes..	May 1	12 bushels..	300 bushels	20	50	
Rutabagas....	July 1	.....	500 "	8	20	Drilled yield most.
Butter	.....	.....	.....	10	20	

It should be observed, the above table is the result of culture *without manuring*, and is the lowest average of such products. Many individuals produce much more to the acre.

The production of pork is necessarily much limited; scarcely any has been fatted with grain. Hogs, except the past season, have become very fat on mast.

The attention of our citizens has not been sufficiently turned to any other branch of agriculture to demand special notice.

Very respectfully, yours, &c.,

B. F. HOYT.

To the Commissioner of Patents.

Santa Fé, New Mexico,
December 23, 1852.

Sir: At the request of his excellency Governor Lane, I have the honor to send you the following communication, by way of reply to your Agricultural Circular of the present year:

Indian corn is one of the chief agricultural products of New Mexico, but without irrigation there is no certainty of success in its cultivation. When the season bids fair to be unusually propitious, by the fall of frequent showers before the commencement of the regular rainy season, the farmer occasionally ventures to plant a small quantity of ground beyond the reach of his irrigating canals, with the expectation that, should his corn fail to mature itself, he will be at least repaid for his labor by a moderate harvest of fodder. As no one has heretofore felt sufficient interest in agricultural pursuits to test with accuracy the capability of the soil, it is not possible to say what has been, or what may be, the

* Minnesota oats per bushel are two pounds heavier than Illinois oats.

maximum yield per acre. It is, however, certain that, under favorable circumstances, the yield could be made as great as the average product of the most favored region in the States. I have seen in the southern part of the Territory, at Doña Ana, fully as fine corn as the State of Ohio is capable of producing. Doña Ana, however, is a new settlement, and what is said of it cannot apply to the other settled portions of the Territory, the greater part of which has been much exhausted by very many years of unremitting cultivation, without rotation of crops, without rest, and without manuring, or any other means of preserving the natural fertility of the soil. The actual yield of lands thus carelessly cultivated is a matter of astonishment to the farmer from the States.

Whether it be owing to the natural fertility of the soil, or to the well-known invigorating influence of artificial irrigation, certain it is, the lands of this portion of our country appear to be inexhaustible. The crops of corn produced this year in the immediate vicinity of Santa Fé have been such as amply to repay the labor of the farmer, although produced upon lands which have been cultivated certainly for a period of not less than 200 years—and that, too, in all probability, without the intermission of a single season.

The most impoverished lands, where water is attainable, will well repay the labor of cultivation, and their average yield per acre, it is presumed, will not fall short of 25 bushels. The best lands, under similar favorable circumstances, will produce from 50 to 60 bushels. Judicious cultivation could scarcely fail to increase these quantities very materially. The variety of corn here cultivated bears a strong resemblance to that which is most common in the New England States. The average height of the stalk is not more than six feet, and the ear is generally within one foot of the ground. The cob is large, but, by way of compensation, is unusually long. The grain is roundish, instead of long and flat, and the germ or heart is in larger relative proportion to the rest of the grain than is generally the case with the varieties produced in the States. Hence the corn of New Mexico is more nutritious than that of the States.

The colors are numerous—blue, yellow, white, red, and even jet black. Blue seems to be the predominant color, and is esteemed by the natives as the richest of all, being almost universally used by them in making the *tortilla*, or their corn cake. This is the only shape in which they prepare corn bread for the table.

The time of planting in this portion of the Territory is from the last week of April to the last week of May, inclusive; whilst in the latitude of El Paso it is some three or four weeks earlier.

The grounds destined for this crop receive but little previous preparation. A thorough irrigation is the first step taken, and this is done with the double object of mellowing the earth, to facilitate the use of the plough, and to furnish sufficient moisture to cause the grain to sprout and rise above the ground. The next step is to run those furrows alone which are meant to receive the seed. The plough is used in covering the corn, which is never planted in checks, but always in rows about three feet apart. From three to six stalks are suffered to grow in a single hill, and the hills are very much crowded, the intervening space being barely sufficient to admit the use of the hoe. Between the period of planting and that of maturity, the crop receives, as a general rule, but

one ploughing and one hoeing. During the same period it receives from two to four irrigations, according to the nature of the weather and the supply of water in the canals.

Where there are large settlements on small streams, each cultivator must await his turn in the use of the water, and the farmer is thus often restricted to a single irrigation during the summer. In truth, instances are not unknown in which certain water courses, by reason of long protracted drought, have not furnished water sufficient for one irrigation. Fortunately, however, for New Mexico, this is not common, and two or three irrigations, especially when assisted by a chance shower, are amply sufficient to produce a remunerative crop. The productiveness of the soil is, of course, enhanced in proportion to the accessibility and use of water, within proper limits.

Speaking in an agricultural sense, land in this country is nothing, and water is *everything*. Lands in the States without running water have value; lands in New Mexico without water are without value to the agriculturist. There is not a single crop of the husbandman that can be produced in this country with any degree of certainty without irrigation. At long intervals, propitious seasons do occur, it is true, but, without prescience, no advantage can be taken of them.

In this connexion I will mention a fact, so singular, indeed, that I would not venture to relate it unless I had previously obtained such evidence of its truth as places it beyond all doubt. The Navajos, a powerful and partially civilized tribe of Indians, who occupy the western portion of New Mexico, do *not* irrigate their lands, and yet produce plentiful crops of corn. Their method of planting is as follows: Holes are made in the ground to the depth of 12 or 18 inches, by driving down stakes made of firm wood and hardened in the fire. Each hole receives one or more grains of corn; the grain is, however, first enveloped in a ball of mud above the size of a man's fist. The ball, with its seed, being dropped into the hole, is covered to the depth of two or three inches with light earth, and left to germinate. The hoe is the only implement made use of in the subsequent management of the crop.

The object of the ball of mud is obviously to supply sufficient moisture to enable the corn to spring up, whilst the too early evaporation of this moisture is prevented by the thin layer of earth which is thrown upon it.

The great depth of the hole, too, is not without its reason, which is obviously to shield the root of the future plant from the heat and dryness of the superficial earth, and thus enable it to grow alone by the greater moisture of the subsoil.

This fact leads us to indulge the expectation that the agricultural capacity of New Mexico will be greatly increased when deep ploughing, with the American plough, shall become general. I am informed that those few New Mexicans who have introduced ploughs from the States have already verified the fact that deep ploughing diminishes considerably the necessity for irrigation. The capacity of the Territory, in an agricultural point of view, is limited by, and dependent upon, the supply of water; yet it may not be an exaggeration to state that the supply, such as it is, if judiciously administered to the soil, would give sustenance to more than a million of human beings.

The price of corn is now, at this place, $3 the fanega, (about 2¼ bush-

els.) It can sometimes be had, especially about the time of gathering the crop, for one-half the above price.

Wheat.—The climate and soil of New Mexico are eminently adapted to the growth of this Cereal. It is universally sown in the spring of the year, and, for the most part, during the month of April. The ground that receives it undergoes, as with the former crop, no further preparation than a single thorough irrigation. Being thus rendered soft and moist, the wheat is sown upon it and covered by the plough. After this, in order to smother the surface, a light log, as a substitute for the harrow, is dragged over it. Motion is given to the log by connecting each end of it (by a raw hide rope) with the corresponding end of the ox yoke.

From one to three irrigations suffice to mature the crop, which is generally harvested in the month of September. The yield is never estimated here by a comparison with the land which produced it, but always with reference to the quantity sown. Thus, the farmer always says, for one fanega sown he has reaped so many. The product so estimated has a very wide range, varying, as I am credibly informed, from ten to *one hundred* fold. Trustworthy gentlemen from the valley of Taos tell me that they have known a single fanega sown there upon new lands to produce one hundred. Forty-fold is by no means uncommon; indeed, I may safely say that, with a sufficiency of water and judicious cultivation, forty for one might be made the average product.

There are at least five varieties of wheat known in New Mexico, and cultivated to a greater or less extent: 1st, a yellow wheat; 2d, a white; and 3d, a red variety; the ears or heads of these species are smooth; 4th, the common bearded wheat; and 5th, the "siete espigas," or seven-headed wheat, so called from the fact that a number of smaller heads shoot out around the original or main ear. This species may be that which has heretofore been known under the name of "California wheat."

The custom here is to sow very thin—perhaps not more than one-fourth of what is usual in the States. But the plant, in farmer's phrase, "tillers" so abundantly that, in the course of a short time after seeding, the surface of the ground appears to be thickly covered by the growing crop. One authentic instance has come to my notice of a single grain having produced half a pint of wheat. These extraordinary cases are, of course, uncommon, and are only mentioned to impress the fact that wheat tillers or multiplies its stalks in this country to an extent altogether unknown in the Atlantic States, or, perhaps, in any other portion of the Union except the Territory of Utah.

The wheat of New Mexico has but little straw, as its average height does not, perhaps, exceed three feet. Many crops in fact turn out well that do not exceed eighteen inches in height. I will very succinctly describe the manner of getting out and preparing the crop for the market. It is primitive to the last degree:

The matured wheat is cut, with the consumption of much labor and time, with an instrument similar, but far inferior, to the almost obsolete sickle. The harvesting cradle is here unknown, and perhaps unheard of. In getting out the wheat, no agricultural implement, not even the flail, is ever employed. It is done by the tramping of horses, mules, oxen, donkeys, or goats, driven around upon a circular earthern floor. For this purpose goats are more frequently made use of than other animals. The farmer has no farming machine to facilitate the separation of the grain

from the chaff and other impurities. He patiently awaits the coming on of a suitable wind, when the straw is blown off from the wheat by tossing it high into the air with wooden forks constructed for the purpose.

To get rid of the chaff, the same labor is gone over again with a large spade, instead of the fork. Still, more or less of sand, gravel, and clay, remain. These impurities are imperfectly removed by washing the wheat in large and porous baskets. Another plan is to turn a small current of water through a trough filled with the grain. After being dried upon blankets or raw hides, the wheat is considered ready for the market or the mill.

I find I have omitted to mention, in the proper connexion, how the small stones and unthrashed ears of wheat are separated. For this purpose, a screen or sifter (if the words can be so applied) is thus made and moved; a large raw hide is procured, and is perforated, by burning, with a large number of very small holes. Two men move the sifter, each taking an end, by alternately jerking it rapidly towards each other. The wheat passes through the small perforations in the skin, leaving behind such impurities as the wind did not carry off in the previous processes.

The diseases to which the wheat crops of the States are so liable appear to be here entirely unknown; at all events, I have met with no one who has ever seen the Hessian fly or the joint worm. The much dreaded rust of the States is here effectually prevented by the clearness and dryness of the climate. However, at long intervals, the grasshopper has been known to appear in such countless multitudes as to cause most serious injury to the growing crop. This insect, after an absence of 18 years, reappeared in the valley of Taos in 1845. Since then they have gradually diminished, year by year, until they no longer prove a serious evil. In that year, however, they were so numerous and voracious as often to destroy an entire field of wheat in a single night, devouring not only the leaves, but the entire stalk down to the surface of the ground. The young and tender wheat was alone attacked; that which had acquired some height and hardness escaping almost untouched. Hence, early seeding was found to be the safeguard against their inroads. These insects were not only destructive to wheat, but also to cabbages, peas, beans, and almost all other tender and growing plants. They were, more or less, numerous and destructive in all parts of the Territory.

The New Mexican farmer carefully preserves the wheat straw, and upon it feeds his horses, mules, and donkeys during the winter months. It would seem to be remarkably nutritious, as these animals, when so fed and not overworked, remain at least in good condition, if not fat.

The price of wheat this year is $3 the fanega in some parts of the Territory, whilst in others it is sold at half that price. The wants of the United States troops furnish at this time the only market we have that is of much consequence. Flour, of the best quality, is now furnished to the army at $7 per 100 lbs. Should their purchases continue to be made here, instead of in St. Louis, as formerly, a few years will doubtless reduce the price to $3 per cwt.; whereas the freight alone on flour brought from the Mississippi valley has never fallen short of $8 per hundred.

Dairy Husbandry, &c.—I have never seen, since my first arrival in this country, in 1847, so much as a single ounce of New Mexican butter, though a little is said to be occasionally made. The butter that is

used in this city is brought from Missouri, and varies in price from 50 to 75 cents. All persons who are acquainted with this country acknowledge it to be one of the finest grazing regions on the face of the earth; and were it not for the unchecked depredations of the Indians on all sides of us, it would be as preposterous to bring butter here as to "carry coals to Newcastle." The small herds of goats and sheep that find subsistence in the immediate vicinity of the town, and thus escape Indian robbery, furnish to the inhabitants a precarious supply of inferior milk and cheese. Cow's milk is still less attainable, especially during the winter months.

You ask in your Agricultural Circular, "How do you break oxen to the yoke?" The native oxen of New Mexico are subjected to the yoke at so early an age that the process of breaking is never one of much trouble or difficulty. The yoke is a rude and primitive affair. A light piece of cotton-wood is fashioned at either end, so as to adapt itself to the posterior part of the horns of the ox, to which it is securely lashed by strips of raw hide. A rope of the same material connects the central part of the yoke with the beam of the plough, or tongue of the wagon. This plan, of course, increases the burden as felt by the ox, and diminishes his effective strength. The custom, although a bad one, must needs continue to prevail here, as the country furnishes little or no timber that is well adapted to the construction of ox-bows. The Mexican *carreta*, or cart, is a two-wheeled vehicle, so heavy and so rudely contrived that the draught power of two, or at least one yoke of oxen, is consumed alone in moving it. This inconvenience is now somewhat remedied by the substitution of the wheels of American wagons, which are yearly brought here in large numbers by the merchants.

The New Mexican plough does not differ materially from the pictures familiar to school boys of the Roman plough, anterior to the Christian era. A piece of timber, with two branches, is the material of which it is made. One branch serves for the beam, and is left about six feet in length; the other is left eighteen inches or two feet long, and answers for the plough-share. A straight piece of wood is attached to the after-part of this implement for a handle, by which it is directed. The oxen are urged on by a small stick, some five or six feet in length, armed at the end with a sharp nail. This is a cruel instrument, and is often used with such freedom as to leave the sides of the ox covered with blood.

Grasses.—Artificial meadows are entirely unknown in this Territory; nor do the native population ever make hay of any kind. Since General Kearney's invasion, however, the natural grasses of the country have been cut and cured, in quantities greater or less, in proportion to the wants of the cavalry. Excellent hay, thus made, has been this year delivered to the quartermaster in Santa Fé at $20 per ton. The *grama* grass, which is not found in any of the States, covers pretty generally the entire surface of New Mexico, both mountains and valleys. For the most part, it does not cover the ground very thickly; but in certain localities it is found sufficiently thick and luxuriant to be cut for hay. All experience proves it to be more nutritious than any cultivated grasses with which we are acquainted. Mules, and even horses, (the native, and those from a distance, after one year's acclimation,) will remain fat upon it alone, if otherwise well treated. Its fattening properties are due partly to the oil of the seeds, which are very numerous,

and partly to its being well cured, *in situ*, by the natural aridity of the climate in the dry season. As the atmosphere is not sufficiently humid to produce vegetable decomposition, this grass retains its nutriment as long as it lasts. Hence it is that the sheep of New Mexico require no winter feeding.

I doubt whether this grass could be profitably introduced into any of the older States of the Union; as, where lands are very valuable, its yield per acre would perhaps be too small to prove remunerative. There are other valuable grasses in this Territory, but, being of minor relative importance, they cannot be noticed in the limits of this article.

Rye.—I have never seen any of this grain in the Territory, and I cannot learn that it has ever been introduced, even by way of experiment.

Barley, *oats*, and *buckwheat* all succeed admirably. These crops, however, have never been cultivated to any extent. Occasionally, only, an American farmer will be found who produces enough for his own wants. Oats are said to grow wild throughout the mountains in the northern parts of the Territory.

Root Crops.—With the exception of potatoes, all crops under this head succeed here far better than they do in the States. They certainly, as a general thing, attain to a great size, and contain much more saccharine matter. Mr. George Gould, of Taos county, has produced on old lands, unmanured, beets weighing as high as 17 pounds, turnips 16 pounds, and onions $1\frac{1}{4}$ pound. In December last, the late Governor Calhoun was presented with a beet which was within a fraction of a yard in circumference.

All fruits, grains, vegetables, and plants generally, that grow in this singularly clear and dry climate, are remarkable for their extraordinary sweetness. The corn-stalk abounds in saccharine matter to such an extent as to furnish the native population with molasses. It is true this article is hardly so good as the most inferior Louisiana molasses, but this is doubtless owing to their rude and imperfect mode of manufacturing it. Those persons who do not supply their own wants purchase it at the rate of $1 50 per gallon.

The beet, when grown in New Mexico, contains so unusual a quantity of saccharine matter that the manufacture of beet-sugar offers strong inducements to gentlemen of enterprise to embark in that business. A manufacturer would always find here a "protection" of at least ten cents on the pound, as that is the least cost of transportation alone to the merchants who import their sugar from St. Louis, and there is no apparent prospect that freight will materially diminish for a long series of years. The population of this Territory is something more than 60,000, and nearly all the sugar which they consume comes from St. Louis, Missouri. For the most part, the most inferior kind is brought, and its usual wholesale price ranges from 19 to 25 cents. Sugar brought from the valley of the Mississippi, in wagons, across a desert of nearly 900 miles in extent, surely could never compete with sugar made from the beet in this country, where labor is abundant at from $4 to $8 a month. The enterprise could not fail richly to repay the employment of skill and capital. But the manufacture of beet-sugar has never been attempted, perhaps, because there is no one in the country who has the slightest knowledge of the art.

Our Irish potatoes are of excellent quality, and their cultivation is sometimes very successful; but on many occasions, from some cause, which appears to be as yet unknown, the failure is complete. To say the least, the potato crop has heretofore been a very precarious one. A wild potato, similar to, if not identical with, the Irish potato, is found in the mountainous parts of the Territory, but they are too small and too sparse to repay the trouble of gathering them.

I had intended to speak of the grape culture, and wine manufacture—a very important interest of New Mexico—and also of sheep-growing, the most important of all; but as I have perhaps already written to a tiresome extent, it is proper that I should close.

Very respectfully, your obedient servant,

THOMAS E. MASSIE.

To the Commissioner of Patents.

Benton, Oregon Territory,
December 8, 1853.

Sir: Your Circular of the date of August, 1852, has just reached me, to which I proceed to make a brief reply.

In the production of wheat guano is not used at all in this Territory. The average product per acre, to the best of my knowledge, is about 30 bushels. The general time of seeding is from 25th August until the last of October; but my experience has taught me that the best time to sow wheat is in the month of May, in this climate, which gives it eleven or twelve months to grow and mature. When thus sown, its yield has been as high as 40 bushels an acre on land newly broken; quantity sown is from $1\frac{1}{2}$ to 2 bushels. The yield per acre is increasing, from the better attention paid to farming.

The Hessian fly and the weevil are not known in this country.

The prices of wheat, at this time, cannot be considered as a general thing. It is now worth, at our barns, $3 per bushel, and our best markets are paying $5 per bushel; but this cannot last long.

Corn is not much raised, but with proper management we can raise a sufficiency for home use. I raised at the rate of 30 bushels per acre on the small spot I planted.

Oats I sow in October, about 2 bushels per acre, and the yield is most universally 40 bushels per acre.

Peas and *beans* do well. Peas enrich the land rather than exhaust it.

Butter.—Average yearly product of butter per cow, 75 pounds. Mode of churning is with the old fashioned dasher churn. Average price per pound, 50 cents, though now selling at 75 cents at home.

Neat Cattle.—Cost of rearing till 3 years old is nothing more than a little salt and a little time to look after them; worth at that age, for beef, from 8 to 12 cents per pound.

Milch cows are worth from $60 to $85.

Horses and *Mules.*—The raising of these animals is profitable, the expense of rearing being small.

Sheep do well, and are profitable both for wool and for driving to the mines to be used for mutton.

Turnips, carrots, beets, &c., are very prolific, but are raised principally for home consumption.

Irish Potatoes.—Average yield per acre, 200 bushels. Most profitable varieties are the Kidney and large Blues.

Fruit culture is receiving great attention. We have most every variety of fruit trees adapted to our climate now in cultivation.

The above remarks are brief, and, should they be deemed worthy to be inserted in your valuable book, I shall be more than compensated.

Respectfully, &c.,

O. C. MOTLEY.

To the COMMISSIONER OF PATENTS.

V.

THE POTATO—ITS NATURAL HISTORY—DETERIORATION AND IMPROVEMENT.

Under the auspices of the New York State Agricultural Society, the Rev. C. E. Goodrich, of Utica, has devoted much time and research to the propagation and improvement of the potato; and his labors are regarded by the officers of said society, (very competent judges,) and others, as having developed facts of some importance in the course of experiments continued through several years. We copy from the proof-sheets of the Transactions of the Society for 1852, kindly furnished for that purpose by its secretary, B. P. Johnson, esq., so much as is deemed of general interest and as our limits will permit.

The Rev. Joel Blew, of Howard county, Maryland, has bestowed considerable thought on the diseases of this tuber, and made experiments in cultivating it, from whom a communication has been received on the subject. Indeed, the "potato rot" is a fruitful theme, and no disrespect is intended in declining to fill the annual agricultural report from this Bureau with speculations more voluminous than profitable.

I.—THE NATURAL HISTORY OF THE POTATO.

This subject is treated at some length in the Transactions for 1847, as before referred to. I here add some further facts:

A friend of the writer spent some time at Bogotá, a city of New Granada, situate upon the mountains, 8,500 feet above the sea, 5° of north latitude. During his residence there, in 1847 and 1848, he found the climate free from frost through the whole year. The thermometer never rises above 84°, nor sinks to the freezing point; nor does it ever vary more than 5° in any one day. There he found, as Humboldt had more than 40 years before, potatoes of the very best quality. The climate was found too cool for melons and many other tropical plants, which were brought on mules from warmer regions lower down the sides of the mountains. Here, too, many species of plants—as some varieties of peppers and cabbage—never cease growing. It is, hence, obvious that *the potato loves a cool, uniform, and long season*, the very reverse of what it finds here, where we frequently have *a hot, unsteady, and short sea-*

son. Nothing but the greatest constitutional vigor could ever have sustained the potato in a prosperous growth in the same soil and climate that produces melons, tomatoes, corn, egg-plants, &c. We see, from the foregoing facts, the reason why the potato flourishes in Iceland, and even in Siberia. Wherever it has shortened the season of its growth, and finds a few weeks of summer weather free from frost, there it will mature a crop. We see, too, why, in this climate, the potato does best in elevated, and even mountainous districts, where it finds a cool position and moist, mucky soil.

II.—THE TWO-FOLD SYMPATHY OF THE POTATO.

1. As a simply tropical plant, it requires, like the most of its class, *steady and uniform weather, but less heat than most of its associates.* It fears not only frost, but all sudden and extreme changes. From such changes I think most of the diseases occurring in my experience before 1850 arose.

2. As a mountain tropical plant, it will not only bear, but *requires for its best development, more air, moisture, and coolness than most other tropical plants.* The nasturtium, however, is found growing on the mountains of South America, in company with the potato, beyond the limits of all other cultivation. Exactly in harmony with these facts, the nasturtium will grow, both in England and the United States, in cooler positions than any other tropical plant, except the potato. The potato, in these respects, sympathizes with our common hardy plants. The damp and hot weather that injures grapes, plums, and gooseberries, by mildew, that rusts wheat, and rots cabbage and turnips, will, at the same time, mildew the potato.

III.—THE WEATHER OF 1851.

As the potato disease is ruled by the weather, so it seems in order first to speak of it. The season, as a whole, was wet from frequent and often heavy rains, and a state of things very different from that which existed in other and more remote parts of the country. It was also unusually steady, without those sudden changes and cold chills that characterize our climate in most years. *May*, and the first half of *June*, were, as a whole, dark, damp, and cool, and so unfavorable to tropical plants in general, but not so to the potato. The last half of *June*, and all of *July*, were hot, damp, and often excessively wet, the showers being intermitted with burning hot sunshine. August was cool, with few warm days —too cool, indeed, for the prosperity of common tropical plants, but favorable to the potato. *September* was warm to the middle of the month, the only thing which saved the corn crop, which had suffered from the wetness of June and July and the coolness of August.

IV.—DISEASE OF THE POTATO—A GENERAL VIEW.

According to Loudon, it is now one hundred, and according to some other writers it is one hundred and fifty, years since the potato began to be cultivated as a common field crop. In the absence of exact historical

dates, we have no very certain or definite account of potato disease until within the last few years. It has been referred to various causes.

1. *Insects, worms, &c.*—But unfortunately it happens that, though the potato, like other plants, has its natural enemies, from some of which it has at times suffered considerably, no one class of insects has yet been discovered whose ravages have been of a nature and extent sufficient to produce the disease in the form in which it has appeared. But admit the extent of injury claimed for insects, yet *the existing disease is not occasioned by their ravages, because clearly it is occasioned by another cause, adequate to its production, just in this form.* And where different varieties have been planted side by side, a portion of the varieties have been diseased, and another portion not. This result has followed regularly year by year—a fact quite inconsistent with the idea that it is occasioned by an insect.

2. *Deficient soil.*—But the disease often invades new soils of the most faultless character; nay, in this case, as in the preceding, one variety has exhibited disease, and one not, during the same year and in the same circumstances of culture.

3. *Fungus, mould, or mildew.*—This theory is doubtless partly true, but not true in the sense in which I have usually understood it to be explained. The mildew, so far from being the *originating* cause of the disease, is, as I suppose, but the *result and proof* of pre-existing causes, arising from the action of the weather on the constitutional weakness of the plant.

4. *Exhausted energy and consequent exposure is suggested as the true explanation of the disease in every case.*—This theory exhibits two aspects:

(A.) *First aspect of disease.*—In this case, cold, wet, and windy weather, following that which was hot, dry, and stimulating, seems to paralyze and deprave the circulation of the plant. Thus chemical changes overcome vital energies. Besides this, the action of the wind lacerates the foliage in many cases. On the return of warm weather, especially if it be sudden, the action of both sun and wind dries up the injured foliage before the exhausted circulation can be restored from the root, which, partaking of the general torpor of the plant, and secluded from the action of the atmosphere by the wetness of the soil, had nearly lost its action. The injury of such a chill is seen to be partly mechanical and partly chemical, and to be closely analogous to that which takes place with all vegetation under the permanent dark and damp chills of autumn. It is also not unlike the injury of hot-bed plants removed too early, and without due preparation. The proofs of such a morbid condition of the potato, thus theoretically stated, will now be exhibited.

(*a.*) *A pallid appearance of the leaves, and often a slightly crumpled state of their edges.*—There is a loss of that intense verdure that characterizes the potato in a state of high and healthful growth. The hue becomes yellowish, and sometimes reddish-green. It is such a change, however, as does not strike a careless observer. *This change of color is undoubtedly in all cases the first and leading indication of disease, and one that becomes a key to all the rest.* It is seen in many cases before the chill passes off, and always within two or three days after. No one can doubt that this appearance indicates a bad state both of circulation

and elaboration, on both of which economies not only the health, but the life, also, of a plant depends.

(*b.*) *Wilted leaves and falling flowers.*—Speedily after the change of color just noticed, the top or youngest leaf of the plant withers. It is usually but a *part* of the rosette of leaves that crowns the plant that thus wilts. The flowers, also, whether open or not, fall off without forming any balls. The stems of the flowers break off at the natural joint, a half inch below, through mere starvation.

(*c.*) *A blue color on the point and edges of the upper and outer leaves particularly, and a yellow, iron-rust look on the lower and inner leaves.*—Can any one doubt that these marks indicate the formation of an acid in the leaf of the potato in cool weather, in June and July, any more than that whole forests of trees should exhibit the same appearances under the permanently damp, cool, and dark weather of September?

These indications follow closely upon the falling flowers and wilted leaf, and progress more or less rapidly, according to the severity of the chill. Sometimes, on any given day, you will find scarcely a discolored leaf; and then in three or four days a whole field will be discolored by them. These indications end in the speedy death of the whole leaf, the whole of the three indications (*a b c*) acting almost with the speed of frost. At other times these indications are scattering and act slowly. In such a case they soon disappear, and the crop recovers and grows on. In a few cases the vines also speedily die after the fall of the leaves; but more commonly they do not, but struggle a while to live without leaves, and eventually die of starvation.

(*d.*) *Decay of tubers.*—If the preceding signs of disease are very violent, the tubers are rarely injured, whether they are one quarter or even three quarters grown. But if its progress is slower and the foliage dies a lingering death, the tubers are sure to be affected by rot.

Just as often as severe chills in the middle of summer occur, so often will many or most of the old varieties exhibit these signs of disease, provided they recovered from the first attack. In reference to the foregoing signs of disease, I now ask, is the disease of the tubers a mystery? And is there any mystery in the exhibition of such signs of disease, coming, as always and only they do, in connexion with a chill?

(B.) *Second aspect of disease.*—This seems to arise from hot and wet weather, intermitted in many cases with calm, bright, and scalding sunshine. This engorges the plant beyond its powers of healthful elaboration. The constantly wet state of the soil hinders the action of the atmosphere upon it, and so enhances the previous difficulty. The cuticle of the whole plant, the leaf especially, formed amid such circumstances—circumstances akin to the condition of a hot-bed plant, with too much heat and water and too little air—the cuticle, I say, thus formed, is necessarily tender. Then the hot sun acting on the plant with its juices thus diseased, and its cuticle thus tender, greatly injures it.

The visible morbid indications arising out of these circumstances are the following:

(*a.*) *A spotted and livid appearance of the leaves*, sometimes interspersed with the pale aspect noticed in (A)—(a) above, and giving the leaves of the plant an appearance of irregular patch-work.

(*b.*) *The withered leaf and falling flower* also appear, but much less than in the first aspect. The flowers, especially, fall much less speedily

than in that case, and only after being fully and for a considerable time expanded. Strong varieties, indeed, in this state of weather, set seed-balls freely.

(*c.*) *Steel blue tips on the upper leaves*, and iron-rust stains on the inner and lower ones, appear as before, but less frequently.

(*d.*) *Mould or mildew.*—This is the one mark of disease, in this second aspect of it, that rivets the attention. It breaks out everywhere upon the plant.

(*a.*) *Upon the leaves*, beginning in the dark, livid spots, and spreading, like a contagious cuticular affection upon an animal, until it destroys the whole leaf. This mark is obviously a parasitic fungus, which feeds on the depraved juices of the plant.

(*b.*) *On the stems*, especially two or three inches from the upper extremities of the plant. In this case it destroys the whole cuticle, but in moderate cases does not destroy the stem, whose internal circulation yet continues. The stem above this point is as green as before, and frequently is broken partly off by the wind, hangs down, and continues to grow.

(*c.*) *The flower stems* also become affected with mildew, frequently, but not always, dying. Often the balls, formed and forming, continue to grow.

(*d.*) The balls, whether small or full-grown, are seized, if small, with mildew; if full grown, with a brown appearance, which pervades the whole structure, just as in the case of melons, tomatoes, and egg plants, noticed in my former essays on this subject. (See Transactions for 1847, pages 442, 443.) Those full grown balls do not usually rot, but continue firm and unnaturally hard. On one of my South American varieties I had nearly one bushel of balls in this condition, amounting to about one-fourth of the crop of balls. The balls that set late, on all sorts, after the season of mildew passed away, set and matured without an attack of this sort.

(*e.*) *The tubers*, so far as my experience goes in 1850 and 1851, are less likely to be diseased than under the first aspect of disease. Disease also comes upon them, I think; while as yet the mildew has made very little development. Here, as in the first aspect of disease, the strongest varieties suffer least; some of my home seedlings, and most of my foreign sorts, scarcely at all. Here, also, if the first attack is light, the plant recovers and continues to grow, but may, in fitting weather, suffer a second attack. Unfavorable weather may be of that mixed character that the two aspects of disease shall be mingled, more or less. Indeed, they obviously are not very different, each having many of the same indications, and each being the result of severities of weather.

Observations on both aspects of disease.

1. The first aspect of disease alone prevailed previously to 1850; the second has been noticed mainly and almost exclusively in 1850 and 1851. I make this remark with much diffidence. The field is wide and mainly untrodden, and may need renewed observation in coming years.

The preceding description of disease has cost me much time and observation, and is made with the consciousness that I have reported the indications of nature as wisely and truly as I was able.

2. The months of June and July, particularly from the 25th of June to the 20th of July, is the season when the potato is most likely to be diseased. That is the season when the changes of weather are most sudden, and when the potato exhibits the largest quantity of foliage, and in the most tender and susceptible condition. Those who judge of the potato disease mostly from the indications on the tuber, will not ordinarily find it until a much later period.

3. These two aspects of disease are seen to be in exact sympathy with the two-fold sympathy of the potato. (See p. 355, in No. II.) The first aspect of disease is suffered in common with most other tropicals cultivated in this climate. This point is fully illustrated in the Transactions for 1847, pages 442—444, and for 1848, pages 411—414. So the second aspect of disease is suffered in common with many hardy plants and fruits—such as plums, gooseberries, walnuts, apples, &c., and some vegetables—as carrots, turnips, and cabbage.

V.—ACTUAL OCCURRENCE OF DISEASE IN 1851.

June 28.—Potatoes have now been up about one month. Noticed to-day withered leaves and falling flowers on some sorts got from Buffalo, and others from near New York city, and also in the old early Pink-eye.

June 30.—Saw a few steel-blue tips on the leaves of some of the weaker sorts. The weather, for two weeks, has been damp and hot. Plums are rotting badly. Gooseberries and peaches are scalding on the sun-side.

July 3.—Most ordinary varieties are now dropping their flowers, whether open or not. Potato disease reported at Portsmouth.

July 7.—Weather still damp and hot. Some foreign sorts, received this year, are setting new balls very freely.

July 23.—Color of foliage has long been bad; it now exhibits a pale, sickly green, intermingled with dark, livid spots. Blue tips are now abundant on feeble sorts. Saw the first mildew to-day. It occurred on varieties from the western part of the State, in a position where they were planted rather closely and grew luxuriantly. Saw many mildewed leaves in the field of a neighbor. This exhibition of mildew is four weeks later than last year; exactly in harmony with the relative commencement of hot and wet weather, which began, in 1850, July 14; in 1851, June 14. Diseased potatoes first seen in the Utica market to-day.

July 23 to 30.—Balls setting quite freely on some foreign sorts, on the seedlings derived from them, and on some of my home seedlings.

July 25.—Hot, wet weather. Potatoes closely planted and falling down badly; present many yellow leaves, dying and dead, in the centre of the plant.

July 26.—Found one diseased tuber. Potato disease reported in Ireland.

July 28.—Hot and wet weather, with severe, scorching sunshine. The aspect of the foliage very bad. Mildew, first seen on the 23d, is now everywhere apparent on all the old varieties, and usually in proportion as they are close planted and have grown luxuriantly. These indications are scarcely seen in my best foreign sorts and home seedlings.

July 29.—Noticed that, in extreme cases, the mildew extends to every part of the plant, stems, leaves, flowers, and balls. Considering the engorged state of the plant, after three weeks of continuous, hot, wet weather, intermingled with hot, burning sunshine, one cannot but fear the worst consequences to the potato crop. The progress of the mildew is very rapid.

July 31.—Three days of cooler weather, without rain, produces a little check to the progress of mildew. The diseased leaves are sloughing off, while its progress is often arrested on a single leaf, the diseased part falling off, and the remainder continuing green. The drier and cooler state of the atmosphere seems to have strengthened the cuticle, and allowed the engorged juices to dissipate, thus removing the cause of mildew.

August, being mostly a cool, dry month, was favorable to the health of the potato, especially as a means of checking the progress of mildew.

August 13.—The foliage of my ordinary field-crops is nearly all brown. The cool weather of the last two weeks has undoubtedly saved the potato crop in Central New York. Indeed, I think that one week's continuance of such weather, as had for some time been in existence previously to July 27, would have destroyed all common varieties of potatoes, root and branch.

August 15 to 19.—Seed-balls are setting very freely. Many sorts, as the yam potato, and some, both of my home and foreign seedlings, that had refused to set during the continuance of the mildew, are now setting freely. As most of these varieties had manifested great permanence of flowers, the failure to set fruit undoubtedly arose from want of sufficient dryness in the air for the delicate operation of fructification. That this failure to set seed-balls did not arise from weakness is evident from another most remarkable fact: the flower-stems, even the small ones that had shed single flowers, subsequently turned to leaf-stems, and grew, in some instances, from six to ten inches in length; and, where this was not the case, they became covered with leaves; these leaves and stems were doubtless the result of those juices originally elaborated for the support of the seed-balls which failed of setting. In the case of old and feeble varieties the flowers usually fell while yet in the bud, and the very stems on which they grew often withered from weakness, or were dwarfed.

VI.—RESULTS OF THE SEASON.

1. My foreign sorts, generally, except some imported this year in a shrivelled and feeble state, have substantially resisted the mildew, and even in this excepted case they recovered, set more fruit, and were eventually killed by the frost. My seedlings, also, both home and foreign, were generally but little injured.

2. I have seen no single hill of potatoes this year entirely exempt from mildew, although I had many on which a careless and ignorant observer would have noticed no signs of disease.

3. The seed-balls of this year have, in many cases, been very large; n one case the larger balls weighing one-half ounce each.

4. Fruit generally has been injured. Plums, on my sandy soil, have been a failing crop, though setting abundantly, and also protected from

the curculio. They rotted when two-thirds grown, partly after and partly before the untimely fall of the leaf. The Elfrey, Damson, Prince's Imperial Gage, and the Yellow Gage all did tolerably well, and in the order here indicated; but most other sorts failed almost entirely. My neighbors, who had plums on heavy clay soil, were much more successful. Grapes failed exactly as plums did.* Gooseberries and peaches were both injured by a sun-scald on the sun-side of the fruit. Apples—many varieties were spotted and dwarfed worse than I ever knew the same sorts to be before. Others were not sound, and showed a disposition to rot as I have never known the same sorts to do before. Walnuts, both shag-barks and black, were very poor, the meat being either shrivelled or bad in flavor.

5. Tropical plants were injured the first half of June by the coolness of the weather. During the long season of mildew, they suffered, not however, I think, from that cause, but from profuse rain. The ripening fruit was injured in August by the general coolness of the weather.

6. From all the foregoing considerations combined, I conclude that the weather of 1851 was peculiarly unfavorable to the health of the potato, and would have been so had it occurred fifty years ago. The timely cool, dry weather of August saved the crop from much rot; but, as the vines were already dying, the crop has been light from the smallness of the tuber. The foliage of the crop in Oneida county was generally all dead by the middle of August.

7. In parts of our country where the season was dry and hot, or dry and cool, the preceding suffering of the potato crop was not, of course, felt, and will scarcely be appreciated.

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APPENDIX TO ARTICLES ON POTATO DISEASE IN 1851.

MISCELLANEOUS FACTS AND OBSERVATIONS.

1. *Culture of Potatoes in the Southern States.*—"In Mississippi and parts adjacent, the best common potatoes that we have ever seen were planted in November and December. Plough the ground deep—not less than ten inches—twenty would be better—open a deep furrow and fill it with good stable manure, well trampled down; cover it slightly with earth and lay the tubers on ten or twelve inches apart; then cover with a heavy furrow turned up from each side and smoothed down with a hoe. Average the furrow so that the water will not stand, and you will have a good crop."—*American Agriculturist, December*, 1847.

The noticeable points here are the *earliness and depth of planting*. These points have both been urged in the preceding essays. They give deep and wide-spread space to the root, and thus secure the plant from drought, heat, and sudden changes, while the crop is matured before the

* No one who watched the progress and appearance of mildew on the wood and leaf of the grape can doubt that its cause was one with the potato disease. The unnatural hardness and the brown tinge of the berry of the grape, without and within, corresponded exactly, moreover, with the similar appearance of the potato ball this year, and with that of diseased melons and tomatoes in former years.

highest heats and drought of summer. The usage of the South is based on the implication that *the potato requires cool and moist culture.*

2. *Culture of the potato in cold and wet weather in France.*—In the northeast part of France lies the district called Ban de la Roche. It was the residence of the celebrated Oberlin. In the life of that excellent man, (Philadelphia edition, 1830, page 81,) we have the following record:

"By his extraordinary efforts and unabated exertions he averted from his parishioners, in 1812, 1816, and 1817, the horrors of approaching famine. The new crop of potatoes that Oberlin had lately introduced formed the principal subsistence of the people during those disastrous years, *when the season was so rainy and cold that they could not get in two-thirds of the grain at all.*"

The single point which I wish to notice here is the fact that, in a *cold and wet season*, when grain could not be obtained for food, the potato was productive, and became the chief reliance of the people. The climate of the northeast of France is much cooler than that of New York and New England, and much less exposed to severe and sudden changes. Here is proof that the moist and cool soils—such as are usually found in mountainous districts—are congenial to the potato. The last two years noticed above will be well remembered as having been years of scarcity and suffering in our own country. During one of them, (1816, I think,) we suffered at least a slight frost in every month of the year. The potatoes were excellent, and the grass, though short, made very rich hay. Rye was sold at $2 per bushel, and other grain correspondingly high that year.

3. *The potato not an acclimated plant.*—The impression is widespread that tender tropical plants can be gradually carried northward, and hardened to the climate until they will bear frost, and flourish there as well as in their native clime. The whole impression is erroneous. Tropical plants may shorten the period of their maturity, and a few probably may be budded or grafted on hardy northern varieties that are nearly related, and thus a little strengthened. But this is the utmost that can be done. The fact that our summers are, while they last, nearly as hot as tropical ones, is the only reason why we can cultivate such plants as corn, cucumbers, melons, pumpkins, squashes, tomatoes, &c. But no one of these bears frost now, or matures good fruit in a short, cool, or wet season, any better than the first year they were introduced. Nay, some species of southern plants, when first introduced, possess a vigor which they afterwards lose.

My Bogotá potatoes, imported in 1848, bear the high dry heats, the wet chills, the lacerating winds, and the sudden changes of this climate, better than any of our old varieties. But they require a long season to mature their tubers, and four years of cultivation have done nothing, or at least little, to shorten it. Nothing, I think, but reproduction from the seed-ball will shorten them, or any plant similarly situated. One reproduction has already shortened the period of maturity in this variety, but not sufficiently. A second reproduction will, I hope, shorten them to the requirements of our climate. As the potato is a mountainous plant, cultivated over a wide extent of latitude, so it is possible, among numerous importations, to find some whose period of maturity will be found exactly fitted to our own climate. So it has been in my experience.

4. *The curled leaf.*—This seems to be a constitutional defect that be-

longs mainly, if not exclusively, in my experience, to the red varieties. The old red, one of our strongest and best old sorts, has it. My large family of home seedlings, derived from it, show it in some of the varieties, even where that variety is much stronger than the parent. So, also, two varieties of reds, sent me from abroad, exhibit it, although the seed was plump and fresh. I have not examined it further than to notice that it comes on early in the season, and hopelessly dwarfs it, but does not disease the tubers.

5. *The relation between bearing seed-balls and the health and vigor of varieties.*—The following thoughts are suggested with great diffidence, though strongly confirmed by the experience of past years. The general impression is that *seed ball bearing is a test of hardiness among varieties of potatoes.* I think the doctrine in general is true, but it has many exceptions and qualifications. The capacity of a plant or tree to bear fruit seems often to depend not entirely on the general vigor of the plant or tree, but also upon the particular character of the flower or of the season. The tree may possess most unquestionable vigor, while the flower may habitually be deficient either in some indispensable organ, or in the vigor of that organ. Those acquainted with the controversy about pistulate and staminate strawberries will understand me. A wet, cold, and windy season at the time plants are in flower, frequently prevents their fructification. Some varieties of pears and plums, as well as of melons and cucumbers, frequently thus suffer. When once a plant or tree has established a character for regular fruit-bearing, and subsequently, and almost habitually, fails to do so, there is undoubted evidence of depreciated energy. The following facts on this subject are clearly ascertained in my experience in regard to the potato:

(1.) All our old varieties in these days of disease drop their flowers without setting fruit. The exceptions are so few as not to be worth naming. The flowers frequently fall when in mere bud, and long before they expand.

(2.) We formerly had a very good potato which bore no flower, and was called the "no-blow."

(3.) The yam potato has exhibited, in the cultivation of 1851, a good degree of vigor, much more than any of the old sorts. Its numerous large white flowers exhibited a marked permanence, but not one of them set for fruit during the prevalence of mildew in the month of July. In August, under cooler and drier weather, they set and matured a moderate quantity of balls. Here I think the fault was in the character (I will not say weakness) of the flower itself, or possibly the weather was too damp for fructification.

(4.) Some foreign sorts, whose tubers were imported in an exhausted state last April, and became liable to mildew in July, set balls earlier than any others, and in amount beyond anything I ever witnessed. *They set them before the occurrence of mildew, while it continued, and after it passed away.* The tubers in this case were very small.

(5.) Other sorts, both home and foreign, set fruit moderately, *both during and after mildew.*

(6.) A variety of home seedlings, which I deem stronger than any other, bore but 3 balls in 25 hills, although the foliage had an unusually upright growth, with numerous flowers.

(7.) Another home seedling, of the same family, and growing near

the preceding, bore one quart of balls in 28 hills; and yet, whether you regard its foliage or tubers, its vigor was little above our old sorts, and by no means equal to that of the family to which it belonged.

(8.) The old Kidney potato was one of the first to feel disease, yet it bears a little seed almost every year upon a few scattering hills found among my field crops. These facts are not easily harmonized with any theory. A variety of potatoes cannot reasonably be expected to bear a heavy crop of balls and tubers at the same time. Both balls and tubers are the result of elaboration in the foliage. The material thus elaborated is derived from the air and earth. Now, if in a given position one variety bears a heavy crop of sound tubers, it is not to be expected that another variety should do the same, and also yield a heavy crop of balls—since, in the last case, the draught made upon the elaborating energy of the plant must have been at least double that of the other; and as the seeds of all plants always contain more mineral ingredients derived from the soil than simple wood, bulbs, or tubers, so, in the case of large crops of potato balls, there is proportionably larger quantities abstracted of important material from the soil than in the case of a simple crop of tubers. No one expects that, during the same year, a tree should make a stout growth of new wood and also of fruit. Unquestionably, the stripping off of the very young balls, or, better, of the flowers, would add, in the case of varieties given to bearing, heavy crops of balls to the crop of tubers. But whether this labor would prove profitable in the end is a question not readily settled, depending on the price of labor, &c. May it not be suggested as probable that in the native land of the potato, where the season of vegetable growth never ceases, the seed-balls and tubers are matured successively?

My Chili potatoes of 1851 bore enormously this year. These balls matured—at least the early sets, which comprehended nearly the whole crop—before the tubers were set, and they were actually gathered in the last four days of August; in the month succeeding, the tubers were mainly produced. Now, suppose this variety could have grown until the first of November, as it doubtless does in most places where the potato is a native, it might have exhibited a large crop of tubers, also; as it was, they were sufficiently numerous, but small, although the vines were green until killed by frost.

Perhaps we have, among our hardy trees and plants, some analogical proof of this sentiment. While a large part of our fruits form bearing wood and fruit in *alternate years*, others of them produce them in different parts of the *same season*. Thus, the raspberry, blackberry, currant, gooseberry, strawberry, tulip, hyacinth, &c., seem in a good degree to form their flowers and fruits in the *early part* of the season; while the fruit bearing wood for the next year, the bulbs and runners, are formed in the *latter part* of the season. So the plum, peach, and other stone-fruits form their *stones* in the *early part of the summer;* while the *mere pulp*, whose formation makes a much lighter draught on the soil, is formed *later in the year*. It is familiar to every gardener, that the draught made on the energy of a plant to form the pod, and almost the full sized berry of the *bean* and the *pea*, is much less than that necessary to give them maturity; hence, if the first sets of beans and peas are permitted to ripen upon the vines, the plant, in most cases, soon dies; while if they are plucked green for market, the plants of most

varieties will set a second, and even, in some cases, a third crop of fruit. We need light on the natural history of the potato; and it is desirable that a State, that for eight successive years has suffered a loss, directly and indirectly, of about half a million of dollars annually by the disease of the potato, should take some efficient means to gather information on this subject. An agent sent to South America, to travel in the native region of the potato for one or two years, might gather rich materials in the study of its natural history.

6. *The liability of the potato to rot not always proportional to its weakness.*—A sort which, from its weakness, yields readily to morbid influences, may lose its foliage so suddenly as to hinder the transmission of the morbid circulation to the tubers. In this case, the tubers will usually be sound, though, if the attack were early, they will be small. In the case of a sort considerably stronger, but not entirely hardy, the disease will be less rapid and more lingering. In this case, the crop will be larger, but the tubers will be more or less diseased. Had a man just two such varieties of potatoes, it would be a difficult question to settle which of them he should plant.

7. *The disease of the potato not specific.*—Some diseases—as measles, whooping-cough, small pox, &c.—are specific; they have a fixed type. Their severity may vary with personal constitution, season of the year, and atmospheric influences; but they have a positive, unmistakable character. On the other hand, such affections as common colds, dyspepsia, and rheumatism have not this specific character; certainly not in their incipient and lighter manifestations. Their existence may be often questionable. Now, the disease of the potato may be compared with this latter class of diseases. It being the result of an infelicity of weather, may exhibit any degree of severity, and end with every variety of result—from that which withers a few leaves of the foliage to that which blackens it, as with sudden frost, or to that which more gradually destroys the whole crop. If this position be true, it obviously follows that the disease admits of no specific remedy. We must improve the constitutional energy of the race, so that it will meet ordinary atmospheric influences without substantial injury. In one aspect of the disease, it suffers with all other tropical plants cultivated here; in another, it suffers in common with most hardy plants. Both aspects of disease are explicable on the common principles of physiology. I doubt not that we should find, could the history of agriculture be accurately written for the period of the past century, that frequent traces of this disease would be found at various times. With just as much certainty I should expect that traces of it would be found on the Andes, and where the potato grows indigenously.

8. Disease does not ordinarily communicate from the injured to the strong tuber. In the autumn of nearly every year, for three or four past, I have stored partially diseased tubers with those that were strong—the small culls of my market potatoes. They were all designed for feeding to stock; often a portion of them have remained until spring. They have then been found a mingled heap of small sound potatoes in a pulpy, rotten mass. Had the heap been large enough to heat, doubtless all would have been lost. The fact is, the potato has a less permeable skin than any other culinary root. This impermeability forbids the transmission of ordinary liquids through it; hence it is the last root to wither

in the sun, and the last to absorb moisture. The withering of potatoes, in ordinary cases, in the spring, is the result, not of the transpiration of their juices, but of their loss by germination.

9. *New modification of aisease.*—I have a new seedling in the family of my home varieties; it is quite hardy in foliage, has a very upright growth, yields well, and is a good tuber for the table. On digging, it exhibited a diseased condition entirely unlike the pervading one. It consisted in a small, wet, rotten spot on the end of the tuber, where the stolon was inserted; it extended, perhaps, to one-fifth of the whole crop of the variety. On cutting it off, the tuber seemed to heal naturally, and the injury was small. This variety grew late; perhaps the injured part was the result of morbid decomposition amid the damps and chills of autumn.

10. The value of green-sward soil for potato crops.

(1.) It affords, as it gradually decomposes, the most natural nourishment of the potato.

(2.) It is a slow conductor of heat, and so preserves an equable temperature about the root.

(3.) It preserves moisture in the soil.

(4.) It forms a loose mass, in which the tubers may readily form. Coarse manure subserves all these purposes, but in a much less perfect and economical manner, and, while the potato is weak, in a manner much less safe.

11. *Mode of securing the best tubers for seed.*—Besides the frequent renewal of the potato from the seed-ball—a thing never long to be neglected—something may be done to *continue* the vigor of existing valuable varieties.

(1.) Let every cultivator plant a small plat for seed in good medium soil and fair exposure; thus he will be likely to secure tubers of the highest health.

(2.) For ordinary winter stores such seed may be planted in somewhat richer soil. The forcing of it by a richer cultivation, for one season, will not be likely to enfeeble it sufficiently to disease it much, while the crop may be large.

(3.) Another portion of seed may be planted in very rich soil, where it may yield a very heavy crop for early market; but it will be likely to be sold and eaten before any morbid tendencies which such a course of cultivation might produce would be likely to be developed. None of these last should be used for seed.

12. *A seeming anomaly.*—A variety planted very early will sometimes mature safely, when the same sort, planted later, so as to fall under the influence of bad weather, will be diseased. So, also, when disease comes very early, a late growing variety may just escape morbid influences, which come early, and, when better weather comes, mature sound tubers.

13. *The general improvableness of the potato, by reproduction, being admitted, what is the probability of success in a given case?*—The answer undoubtedly will be, that success will be in proportion to the elevated point from which you start. There will always be a tendency in like to produce like.

(1.) Suppose you start with a foreign sort whose first and leading quality is hardiness—one whose flesh, perhaps, is yellow and heavy,

and whose maturity is late: the seed-balls of such a variety will produce a family of seedlings the most of which will be hardy, though few will be highly improved in quality of flesh and time of maturity. They will need, therefore, a second or third reproduction.

(2.) Suppose you start with seed-balls from a home variety which possesses fine shape, color, and white and dry flesh, but is deficient in hardiness: the result from such seed-balls will probably be a family of seedlings which will resemble the parents in all leading qualities, and some few of which will, moreover, exhibit a fair improvement in hardiness, though still needing a second or third reproduction from the seed-ball.

(3.) Suppose the case of a variety, either imported or long cultivated at home—one that possesses a combination of all good qualities. Here it should be remembered that these qualities, particularly hardiness, will one day wear out. It should, therefore, be reproduced from the seed-balls, even though you continue to cultivate the original variety for many years afterwards. In the case of a family of seedlings from such a variety, you may expect to get, proportionably, a very large number of seedlings of good quality the first time you sow seed. Such are the results of my short experience. The proofs of these positions will be seen, or inferred, to a considerable extent, in the article to which this is an appendix.

14. *On the possible occurrence of potato disease in the native clime of that plant.*—

(1.) The potato disease is reported (see Report of the Commissioner of Patents for 1847, pp. 141, 142) to have occurred at Bogotá, in New Granada, and in Peru. This asserted fact is supposed by some to be inconsistent with any and all explanations of the cause. This inference, however, is contradicted by undoubted analogical facts; while it tends to discourage all further examination of the subject.

(2.) The general laws of vegetable physiology are alike applicable to all climes.

(3.) Climate, also, however benignant and uniform it may usually be in a particular place, is not unchangeable. In a portion of France, near Strasburgh, as emigrants have informed me, a succession of unfavorable seasons, within the period of the present generation, so far discouraged the culture of the grape that it was almost entirely abandoned, and was not resumed until recently. The olive, also, was once extensively cultivated in the south of France, but in the hard winters of 1709, 1766, 1787, 1789, and 1820, it was almost totally destroyed. Now, instead of raising a tolerable supply from the country, large quantities are imported from Spain. (See Kenrick's Orchardist, under the word *Olive*.) Other and simular cases of failing vegetation, under occasional severities of the weather, are common in the annals of agriculture and pomology.

(4.) The potato disease has been shown to result from severities of weather, according to well ascertained physiological laws. When it has grown old, and is subjected to too stimulating a course of culture in a climate that was never quite congenial, it becomes diseased in foliage, and also often in tuber.

(5.) Now, suppose that in the native region of the potato the usual steady temperature of the climate is interrupted by chills, rains, and lacerating winds, then, by every consideration of permanence in physiological

principles, disease ought to be the result. So, also, should the damp and hot weather that is common in the plains, below the common location of potato culture there, invade the higher regions on the mountain plains, the same result must follow. It will be said that in a climate noted for its great mildness and uniformity, such changes, and of course such consequences, would not be likely to occur. True, most true; but who will undertake to say that, with such and similar facts occurring in the history of other plants, and standing out on the page of agricultural history, the thing is impossible. And when they occur, like causes must produce like effects.

It should not be forgotten, moreover, that in the mild and genial climate of the Andes, many varieties of potatoes are probably cultivated that would not bear the climate here at all. Such varieties would be likely to suffer under slight severities—such, for instance, as our common varieties would pass through uninjured. These varieties would be the first to suffer there in a season in the least degree incongenial, and this suffering would be sufficient to establish the fact of the occurrence of potato disease there, the relative malignity of which we here could not judge in our ignorance of all the facts in the case.

15. *On the relative tendency of moist and dry soils to produce seed balls.*—

(1.) The yam and four varieties of Chili potatoes, imported in 1851, bore seed-balls equally well on moist and dry soils. There was at the same time but little difference between the two positions in foliage and tubers.

(2.) Of my many sorts of Bogotás—both the original importations of 1848 and the numerous seedlings of 1849—none bore seed on the moist ground, though the health of the foliage and tubers was equal in the two positions.

16. *On the difficulty of getting valuable new varieties of potatoes by importation and reproduction.*—The attempt to improve the potato is not an easy one. It must be made ordinarily with much labor, patience, and skill.

(1.) The reproduction should be made *on an adequate scale*, since, in the case of seedlings from a home variety, but few out of hundreds will combine every good quality, especially hardiness, at the first time of reproduction. So, also, in the case of seedlings from a foreign sort, though most will be hardy, yet few will combine all other good qualities short of a second reproduction.

(2.) So, in importations from a foreign land, not only will there be much expense ordinarily, but, as the imported tubers will come from great variety of climates, it may be, that out of numerous hardy sorts no one will be found exactly fitted to this climate, in its time of maturity. Out of nine varieties noticed above, I have found but one certainly, another with some probability, fitted to all the requirements of this climate.

17. *Potato disease not mysterious.*—Leaves are the means of elaborating the juices of the plant. The quantity and quality of their elaboration will determine the quantity and quality of the crop. If the leaves are early destroyed, before the tubers of the potatoes are fully grown, they cannot be expected to increase subsequently to that destruction. So, if the leaves are diseased to any extent, the elaboration will be unhealth-

ful in the same proportion. It is not wonderful, then, that diseased foliage should produce diseased tubers.

(1.) It is a matter of common experience that tomatoes, melons of all sorts, cucumbers, summer squashes, egg-plants, and most other tropical plants usually cultivated here, are occasionally diseased in seasons of unsteady and extreme weather, and that the potato is diseased under the influence of the same weather.

(2.) Again: it is equally a matter of experience that, in certain other states of weather—when hot and damp—wheat rusts, plums and grapes suffer mildew on the foliage, and rot upon the fruit; nuts are imperfect; cabbage and turnips decay. Meanwhile, under the influence of the same weather, the potato rots, also. Thus, the potato shows a double sympathy, *i. e.*, both with tropical and hardy plants.

18. *California potatoes fail in Central New York, while potatoes carried from the latter place improve in the former.*—In the spring of 1851, California tubers were brought by a returning emigrant, and planted on the grounds of Wm. R. Miller and others, in the town of Marcy, county of Oneida. I saw them on the 5th of August; they had made a fine growth of vine, but were suffering simultaneously and equally with our old varieties.

On the other hand it is said, on good authority, that potatoes carried from the old States recover their tone of health when planted in California. Now, all this is natural.

(1.) A potato brought from California to this climate endures a change from one that is very *uniform* and *mild* to one that is *unsteady* and extreme. Is it strange that it suffers?

(2.) On the contrary, a potato transferred from this climate to California will there find much less to try its constitutional vigor than here. These results, then, so far from being strange, are just what the circumstances demanded, and are similar to what occurs in the history of other plants.

19. *Influence of wide planting.*—I noticed a fact during the past season which, though new, is perfectly natural. Single hills, single rows, rows planted widely apart, and hills at the end of rows and on the windward side, withstand disease better than those otherwise situated. Hence I infer that wide planting and open, airy positions are both favorable to the health of the potato, by securing a freer access of sun and air, and thereby promoting a more healthful action of the foliage, and of course a more healthful elaboration. Numerous cases were noticed, near the close of the season, in which potatoes situated as above described exhibited green foliage, while all around them were dead. Has this fact any bearing on discussions on this subject?

20. *Disease modified by shape of foliage—an upright foliage best.*—My old varieties of potatoes seemed to be diseased irrespective of the shape of the foliage; but, among my new seedlings, *those* are most healthful that exhibit a tall and upright foliage. I do not say that this was universally the case. Some very strong varieties fell to the ground early; but the fact proved true often enough to constitute a rule. This fact needs no comment, other than that *this form of foliage admits the freest and most natural operation of air and light.* Here, again, is a fact that pours a flood of light on the question—Is the disease of the potato the result of weather, climate, and exhaustion, as contended in these papers,

or is it the result of the attack of insects, deficiencies of soil; or fungi, as others think? (Vide Mr. Delafield's experience in wide planting of the potato—Trans. 1850, page 498.)

21. *Inefficiency of supposed antidotes.*—As mildew has been principally concerned in the potato disease during the last two years, and knowing the effect of sulphur in resisting it upon the grape, I was induced to make a similar application of it to the potato. It was mixed with some other substances, as follows: sulphur, ten pounds; wheat flour, three quarts; lime, slacked, two quarts; unleached ashes, eight quarts; and plaster of Paris equal to all the other articles combined. This mixture was made by no particular rule. The wheat flour was for the purpose of making the mass adhere to the leaves of the potato. The other articles will all be seen to be antiseptics. The whole was most thoroughly mixed by being passed together through a sieve before being used. It was applied early in the morning, while the dew was upon the plant, with a small sieve, at the end of a long handle. The application was made to different sorts of potatoes, some of which were considerably affected with mildew, and some very little. Such was the state of the weather after its application, which was made August 6, that it remained upon the foliage—at least, more or less of it—eight or ten days. The application had no perceptible influence either for good or evil upon the crop.

22. *The cause of disease in late-ripening varieties.*—

(1.) It is a settled point in the culture of tropical plants in this climate that their elaborations are less healthful in the cool, dark, and damp weather of autumn than at an earlier period. Melons of all sorts, cucumbers, tomatoes, pumpkins, beans, and even hardy plants—as peas—are never so rich and healthful, when forming their fruits or pods late in the season, as at an earlier period; all this is equally true of the potato. A variety that matures very late, and so, equally, early sorts that are planted very late, will become diseased from that very circumstance.

(2.) There is, perhaps, another reason: while the skin of the mature tuber is very impervious to liquids, not even withering readily under the combined influence of sun and air, the skin of the young potato is very tender, and probably suffers from cold and dampness in the soil in autumn. Whatever may be the explications of the fact, some varieties that I cultivate, whose foliage, under every variety of weather, is strong, but whose tubers, instead of commencing their formation about the 20th of June, as is common, do not begin their growth until the 20th of August, and even in some cases much later—some such hardy varieties, I say, are found diseased in tuber late in autumn.

23. *On the use of small potatoes for seed.*—Practically, I have found no difference in results between the use of large and small potatoes for seed; my experiments in this respect have extended to various kinds, on various soils, and through many years; I have not, however, practised it upon the same variety, and on the same soil, and through a succession of years. Theoretically, I should be opposed to this latter course; an occasional use of small potatoes for seed, especially where you do not save the crop for the seed of the next year, I think entirely safe, neither leading to disease nor diminution of crop.

24. *Reasons of the increased liability of the potato to disease in late years.*—This increased liability is a painful fact. The reason of that

fact, as adduced in the essays of former years, is *exhausted energy*. (See Transactions for 1847 and 1848.) This exhaustion of energy is believed to be the result of long cultivation from the tubers, instead of occasional reproduction from the seed-balls. Our climate, moreover, is clearly less congenial than its native one, being shorter in season, less uniform, and exhibiting wider extremes of temperature. We have, also, over-stimulated it in our anxiety to get large crops. Manuring it for this purpose has made the plant more vascular, as well as overworked its excitability. The proofs of these positions, formerly adduced, were largely inferentia and collateral. The remedy was, also, of the same character: that remedy was reproduction from our hardiest old sorts, reimportation from its native clime, and reproduction from such imported sorts, when they were not quite fitted to our climate, in the first instance, by length of season. The confident tone in which this remedy was proposed was considered by some chimerical. The justification of that confidence is now found in simple matters of fact, respectably attested, and still open to the scrutiny of the incredulous. In short, importations have been made, seedlings have been produced from them, and also from our old varieties. The result of all is, such a character for hardiness and all other good qualities as affords the assurance that a few varieties of the highest character have already been obtained, and that speedily such varieties will be obtained in great numbers. Meanwhile, all other remedies for potato disease, in the shape of change or renewal of soil, antiseptic remedies, and remedies directed to the repulsion of insects, have failed, or at best have been but temporary in their influence, and have not reached the root of the evil.

I have not in this, or in former papers, attempted a minute exhibition of the mode in which, probably, vegetable productions become degenerated by age. This is not a work for me, but for the most acute and discerning of vegetable physiologists. Excepting the slight show of explanation here, and in former papers, (see Transactions for 1847, pp. 453—454; and for 1848, pp 418—421,) I have contented myself with the simple assumption of generally admitted facts.

Experiment—Burying Potatoes.

The annexed account of an experiment made by Mr. Goodrich during the past year having been received while the Transactions are being printed, and being important as regards the disease of the potato, we give it an insertion:

May 8, 1851.—I buried twenty tubers of potatoes about two feet deep in the cellar of an out house. The object was to ascertain whether they could be preserved over one summer, so as to be used the second year for seed. The place of deposite was favorable, as the cellar was cool, and underlaid with living quicksand about three feet from the surface, whose temperature is to-day, at two feet from the surface, fifty-five degrees. They were deposited in a flower pot, and this set in another one, larger; the whole was covered with an earthern plate, and this again by a board; no earth was put in. The sorts of potatoes deposited were two varieties of home seedlings of 1849, one Chilian, and three of more common sorts.

Results and Suggestions.

They were dug out May 20, 1852, having been buried one year and twelve days.

1. They all had grown during the last year and formed vines, which had decayed much as they would have done in a heap in the field. The tubers formed amounted to forty-eight—some of them very small. They were none of them so large as those buried; and were by weight, probably, from one-third to one half the weight of those buried.

2. The old tubers were mostly decayed, as in ordinary experience; but one of them was found sound, except that it was a little cracked; while some others, though retaining their shape, were soft.

3. The tubers were colored like the originals, but not so deeply.

4. They were all sound, since they endured none of those severe atmospheric changes which are conceived to be the cause of the disease, as manifesting itself in recent years.

5. They were found, when opened, beginning to sprout. This is a proof of the strong tendency of the potato to germinate when the appropriate season of the year arrives.

6. As they had no access to soil or water, other than the pervasion of the flower pot by moist air from below, so their growth must have been the result of a mere transfer of matter from the old tubers to the new vines and tubers.

7. They were planted, except the very small ones, May 21st, in nineteen hills, and are to day, July 31st, quite as flourishing as other hills planted with the same varieties of seed.

8. On the 25th of June, just thirty-four days from the time these new tubers were planted, I discovered that the old sound tuber, noticed in No. 2, above, was sprouting, the flower-pot containing it and the other rubbish of this experiment having been left in a somewhat dark and cool position. It was at once planted, and has made a feeble growth of two sprouts four inches long.

9. To those who, on opening heaps of potatoes that had been covered too warmly during the winter, have found young tubers in the middle of the heap half grown, this experiment will not seem at all incredible. Had they been placed in an open box, but still without earth, and set upon the bottom of the cellar, so as to imbibe a little moisture, the superior access to light and warmth which they would have thus enjoyed would probably have made the foregoing results larger.

This experiment, I think, strongly corroborates the suggestions made in late years that the heat and light of our climate are evidently too great for the normal requirements of the potato, and that this excess, taken in connexion with the sudden and severe changes of our climate, indicates the true immediate cause of that disease which has made such powerful ravages during the last nine years. When we superadd to this cause others—such as a course of culture too stimulating, and a neglect to raise it frequently from the seed ball—we have all the needful facts for forming a theory of the potato disease—a disease which is, then, no longer an inscrutable mystery, but a common liability incident to all tropical plants when cultivated in incongenial circumstances.

C. E. GOODRICH.

VI.

SOUTHERN AGRICULTURAL EXHAUSTION, AND ITS REMEDY.*

The great error of Southern agriculture is the general practice of exhausting culture—the almost universal deterioration of the productive power of the soil, which power is the main and essential foundation of all agricultural wealth. The merchant or manufacturer who was using (without replacing) any part of his capital to swell his early income, or the ship owner who used as profit all his receipts from freights, allowing nothing for repairs or deteriorations of capital, would be accounted by all as in the sure road to bankruptcy. The joint-stock company that should, in good faith, (as many have done by designed fraud,) annually pay out something of what ought to be its reserved fund, or of its actual capital, to add so much to the dividends, would soon reach the point of being obliged to reduce the dividends below the original fair rate, and, in enough time, all the capital would be so absorbed. Yet this unprofitable procedure, which would be deemed the most marvellous folly in regard to any other kind of capital invested, is precisely that which is still generally pursued by the cultivators of the soil in all the cotton-producing States, and which prevailed as generally, and much longer, in my own country, and which, even now, is more usual there than the opposite course of fertilizing culture. The recuperative powers of nature are indeed continually operating, and to great effect, to repair the waste of fertility caused by the destructive industry of man; and but for this natural and imperfect remedy, all these Southern States (and most of the Northern, likewise) would be already barren deserts, in which agricultural labors would be hopeless of reward, and civilized man could not exist. Let me not be understood as extending censure to all Southern agriculture, and charging this great defect as being universal. It is truly very general, but there are numerous exceptions, of which it is not my purpose to treat. My present business is with errors and defects of Southern agriculture, and with its points of admitted excellence; as, for example, the elaborate system of rice culture, and for other tillage, the very general and commendable attention paid to the collection of materials for putrescent manures.

* This interesting paper was read by Edmund Ruffin, esq., of Virginia, the justly celebrated American agriculturist, at the late fair of the South Carolina Institute, in Charleston, South Carolina, which we had the pleasure of attending. The author has kindly furnished us a corrected copy, which we hasten to lay before our readers, omitting only the introductory portions, which are of local or personal character.—*Editor of De Bow's Review, New Orleans.*

Nothing has appeared to me more remarkable in the agriculture of this region than the close neighborhood (often, indeed, seen on the same property) of the best husbandry in some respects, and almost the worst in most others. The great error of exhausting the fertility of the soil is not peculiar to cotton culture or to the Southern States. It belongs, from necessity, to the agriculture of every newly settled country, and especially where the land, before being brought under tillage, was in the forest state. When first settled upon, forest land costs almost nothing, and labor is scarce and dear. Even if labor is more abundant, it still will be long before enough land can be cleared to allow changes of culture and rest to the fields; and for some years after each new clearing, it would be even beneficial to continue the tillage of corn, tobacco, or cotton, so as effectually to kill all remains of the forest growth. But as soon as enough land can be brought under culture, and has been put in clean condition, so as to allow space for change of crops and due respite from continual tillage, the previous exhausting course will no longer be best even for early profit. Even in a new country, while land is yet fertile, it is cheaper to preserve that fertility from any exhaustion than it is to reduce it considerably. And in an older agricultural country, like South Carolina, having abundant resources in marl and lime for improving fertility, it would be much cheaper and more profitable to improve an acre of before exhausted land than it is to clear and bring under culture an acre of ordinary land from the forest state, allowing that both pieces are to be brought to the same power and rate of production. New settlers are not censurable for beginning this exhausting culture. But they and their successors are not the less condemnable for continuing it after the circumstances which justified it have ceased. The system was first begun in Eastern Virginia, because it was the first settled part of the present United States, and it continued to prevail, almost universally, until since the course of my adult life began, and only has partially ceased since because the country was nearly reduced to barrenness and the proprietors to ruin. From this erroneous policy so long pursued in Virginia, and the manifest and well-known disastrous results in the general and seemingly desperate sterility of the older settled portion of the State, the younger Southern States might have taken warning, and have learned to profit by the woful and costly experience of others. But it seems that every agricultural community must and will run the same face of exhausting culture and impoverishment of land and its cultivators before being convinced of the propriety of commencing an opposite course, after the best means and facilities for making that beneficial change have been greatly impaired by the lapse of time, and progress of waste of fertility—if, indeed, these means are not then irretrievably forfeited. If, at this time, the work of improvement, with the aid of marl and lime, were properly begun and prosecuted, there would be found here incalculable advantages over those of the pioneers in the like work in Virginia. These advantages would be—first, a ten-fold better supply of far richer and cheaper marl than is found in Virginia; second, much more remaining organic matter, or original fertility of the soil, as yet unexhausted; third, full information to be obtained of the operations and opinions of thousands of experienced and successful marlers to refer to, of which advantage there was almost nothing existing 30 years ago. In South Carolina more marling could now be done in a year, and in a proper

manner, than was done in Virginia for the first 20 years; and, though judging merely by analogy, I infer that the benefit would not be less great in this region than in my own. And now I will state, from unquestionable official documents, something of what has been effected in Virginia—not merely in cases of particular farms, and those entirely marled, which might show tripled or quadrupled products and market returns, and ten fold *intrinsic* value, compared to their former low condition—but cases showing the bearing of the comparatively few marled and limed farms on the aggregate assessed value of all the lands in lower Virginia, and upon the receipts of land-tax from the same, although not one-twentieth part of the whole tide water district has yet been improved in fertility, or is the least better (and probably the great remainder is much poorer) than when the marling of other lands first began to raise the general average of assessed values throughout this whole district. It appears, from the latest State assessment of lands in Virginia for 1850, that the actual increase of value in the tide-water district only, since 1838, the previous assessment, was more than $17,000,000. On this increase of valuation, and at the same rate of taxation, there is more than $17,000 increase of land-tax alone accruing annually to the State treasury. It is obvious that any increased value of lands, caused by their increased production, would necessarily require an increase of labor and of farming stock, and would produce proportional increase of general wealth of the improvers, and would add other receipts from taxes in proportion, all serving still more to augment the public revenue.

The recent addition to the aggregate value of lands in Eastern Virginia is admitted to be the effect of agricultural improvements; and that, more than all, the net increase is due to marling and liming only, would be equally evident if I could here adduce the proofs, as I have done elsewhere.* Further: though 1838 was the date of the earliest assessment made after marling and liming had begun to increase aggregate production and value of lands, it is an unquestionable fact, that the general improvement had been greater and values much lower about 1828. And if this earlier time and greatest depression had been marked by an assessment, then made, the full increased value of lands from that time would have appeared at least $30,000.000 in 1850, instead of $17,250,000, counting from the already partially advanced improvement and enhanced values of 1838. However, even if these, my deductions and estimates, go for nothing, there will still remain the proof, by official documents, of the actual increase of value of lands in twelve years, of $17,250,000, or nearly $1,500,000 yearly. Now bear in mind that these are not the results of the improving of all the tide-water region, nor all of its much smaller arable portion, but probably of not more than one-twentieth of the cultivated land. All the remainder, if uncultivated, is stationary; and, if cultivated, is generally in a continued course of exhaustion; and the small quantity of enriched land had first to make up for all deficiencies of the impoverished, and lessening of production throughout the whole tide-water district; and after all such deductions, still exhibited a clear surplus of $17,250,000 of increased aggregate value. This is the

* In a communication recently made to the State Agricultural Society of Virginia, on "some of the results of the improvement of lands by calcareous manures, on public interests in Virginia, in the increase of production, population, general wealth, and revenue to the treasury."

result of but the beginning, and a very recent beginning, of measures for improvement, executed in every case imperfectly, often injudiciously, and sometimes injuriously, and altogether on less than one twentieth of the space on which calcareous manures are available. The great omitted space will hereafter be fertilized in the same manner. Then the actual increase of value of lands, founded on increased production, will be counted by hundreds of millions of dollars. And this anticipated enormous amount of fertility and capital to be created might have been now in possession if our improvements by calcareous manures had been begun 30 years earlier, instead of there having been continued, through all that time, the progress of wasting and destroying the remaining powers of the soil. South Carolina began exhausting culture much later, and is now full 50 years less advanced towards the lowest depth of that full descent which we had nearly completed. If that future of 50 years of continued exhaustion could be now cut off, and the improvement of Lower South Carolina, by calcareous manures, could be at once begun, and continued, the loss of at least $100,000,000 of now remaining value would be saved, and a gain of $300,000,000, from improvement, would be reached sooner by the same 50 years. This would be better, by all this great value, than even the following out precisely the first sinking and now rising course of Lower Virginia. In that region, the cultivators waited until the fertility of the land had so nearly expired that it was supposed to be in *articulo mortis*—at the last gasp—before the work of resuscitation was begun. The comparative results of the opposite systems of improving and exhausting cultivation may be thus illustrated: Suppose a certain investment of capital will yield 20 per cent. of present annual interest, or net products, and two persons invest equal amounts in the business: the more provident one draws or spends but fifteen per cent. annually of his income, and leaves the remaining five per cent. to accumulate, and to be added to his interest-bearing capital. The other proprietor draws each year, and spends all of the certain and annual average returns of his capital, and five per cent. more of the capital stock itself. He reasons (may I say it) like many cotton-planters, and infers that so small a detraction from his capital will do no harm, as he will have so much the more of quick returns for immediate use or reinvestment. In less than twenty years, one of these individuals will have doubled his original capital, and also his twenty per cent. income, and the other will have exhausted his entire fund. But it may be said (as alleged in regard to the squanderers of fertility) that, as the latter person had received so much more of annual returns at first, he might have reinvested, and thus have retained his over-draughts of annual products. If a planter—and, of course, his over-draughts had been from the fertility of his land—he might have bought another plantation, to work and to wear out in like manner. But even if so, wherein would be the gain? He would have had the disadvantages of a change of investment, of removal, and making a new settlement. But where one man would so save and reinvest his over-draughts from his capital, two others would use, or perhaps spend theirs, as if so much actual clear profit, or permanent income. When the land is utterly worn out, and the total capital of fertility wasted, (or the small remnant is incapable of paying the expense of further cultivation,) it will most generally be found that the channels into which the early full streams of income

flowed are then as dry as the sources. I do not mean that it necessarily follows that the planter who exhausts his land also lessens his general wealth. Would that it were so! for, then, such certain and immediate retribution would speedily stop the whole course of wrong-doing, and prevent all the consequent evils. It may be rarely, and it might be never the case, that the exhauster of land becomes absolutely poorer during the operation. He will have helped to impoverish his country, and to ruin it finally, (by the same general policy being continued;) he will have destroyed as much of God's bounties as the wasted fertility, if remaining, would have supplied forever; and as many human beings as those supplies would have supported will be prevented from existing. And yet the mighty destroyer may have increased his own wealth; nevertheless, he does not escape his own, and even the largest, share of the general loss he has caused. While thus destroying—say $20,000 worth of fertility, the planter, by the exercise of industry, economy, and talent in other departments of his business, or from other resources, may have grown richer by $10,000. But if, as I believe is always true, it is as cheap and profitable to save as to waste fertility in the whole term of culture, then the planter, in this case, might have gained in all $30,000 of capital if he had saved instead of wasting the original productive power of his land. Even if admitting the common fallacy which prevails in every newly-settled country—that it is profitable to each individual cultivator to wear out his land, still, by his doing so, and all his fellow-proprietors doing the like, while each one might be adding to his individual wealth, the joint labors of all would be exhausting the common stock of wealth, and greatly impairing the common welfare and interest of all. The average life of a man is long enough to reduce the fertility of his cultivated land to one half, or less. Thus, one generation of exhausting cultivators, if working together, would reduce their country to one-half of its former production, and, in proportion, would be reduced the general income, wealth, and means of living—population and the products of taxation—and, in time, would as much decline the measure of moral, intellectual, and social advantages—the political power and military strength of the commonwealth. The destructive operations of the exhausting cultivator have a most important influence—far beyond his own lands and his own personal interests. He reduces the wealth and population of his country and the world, and obstructs the progress and benefits of education, the social virtues, and even moral and religious culture. For, upon the productions of the earth depend, more or less, the measure to be obtained by the people of any country, of these and all other blessings which a community can enjoy. There is, however, one very numerous class of exceptions to this general rule, which is, when an agricultural people, or interest, is tributary to some other people or interest, whether foreign or at home. Such exceptions are presented in different modes: by the agriculture of Cuba being tributary to Spain; of many other countries to their own despotic and oppressive home governments; and of the Southern States of this confederacy, to greater or less extent, to different pauper and plundering interests of the Northern States, which, through legislative enactments, have been mainly fostered and supported by levying tribute upon Southern agriculture and industry.

The reason why such woful results of impoverishment of lands as

have been stated are not seen to follow the causes, and speedily, is, that the causes are not all in action at once and equal progress. The labors of exhausting culture, also, are necessarily suspended as each of the cultivator's fields is successively worn out. And when tillage so ceases, and any space is thus left at rest, nature immediately goes to work to recruit and replace as much as possible of the wasted fertility, until another destroyer, after many years, shall return again to waste, and in much shorter time than before, the smaller stock of fertility so renewed. Thus the whole territory, so scourged, is not destroyed at one operation. But though these changes and partial recoveries are continually, to some extent, counteracting the labors for destruction, still the latter work is in general progress. It may require (as it did in my native region) more than two hundred years from the first settlement to reach the lowest degradation; but that final result is not the less certainly to be produced by the continued action of the causes. I have witnessed, at home, nearly the last stage of decline. But I have also witnessed, subsequently, and over large spaces, more than the complete resuscitation of the land, and great improvement in almost every respect, not only to individual, but to public, interests; not only in regard to fertility and wealth, but also in mental, moral, and social improvement.

Inasmuch as my remarks would seem to ascribe the most exhausting system of cultivation especially to the slave-holding States, the enemies of the institution of slavery might cite my opinions, if without the explanation which will now be offered, as indicating that slave labor and exhausting tillage were necessarily connected as cause and effect. I readily admit that our slave-labor has served greatly to facilitate our exhausting cultivation; but only because it is a great facility—far superior to any found in the non-slave-holding States—for all agricultural operations. Of course, if our operations are exhausting of fertility, then certainly our command of cheaper and more abundant labor enables us to do the work of exhaustion, as well as all other work, more rapidly and effectually. But if directed to improving, instead of destroying, fertility, then this great and valuable aid of slave labor will as much more advance improvement as it has generally heretofore advanced exhaustion. The enunciation of this proposition is, perhaps, enough. But if any, from prejudice, should deny or doubt its truth, they may see the practical proofs on all the most improved and profitable farms of Lower and Middle Virginia. On the lands of our best improvers and farmers—such as Richard Sampson, Hill Carter, John A. Selden, William B. Harrison, Willoughby Newton, and many others—slave-labor is used, not only exclusively, and in larger than usual proportion, (because more required on very productive land,) but is deemed indispensable to the greatest profits, and operating to produce more increase of fertility and more agricultural profit than can be exhibited from any purely agricultural labors and capital north of Mason and Dixon's line. There is another and stronger reason for the greater exhausting effects of Southern agriculture, and therefore of tillage by slave labor: the great crops of all the slave-holding States, and especially of the more Southern—corn, tobacco, and cotton—are all tilled crops. The frequent turning and loosening of the earth, by the plough and hoe—and far more when continued, without intermission, year after year—advance the decomposition and waste all organic matter, and expose the soil of all

but the most level surfaces to destructive washing by rains—and rains the more heavy and destructive in power in proportion as approaching the South. The Northern farmer is guarded from the worst of these results, not because he uses free labor, but because his labor is so scarce and dear that he uses as little as possible for his purposes. Besides this consideration, his climate is more suitable to grass than to grain, and his other large crops are much more generally broadcast than tilled. These are sufficient causes why, in general, the culture of land in the Northern States should be less exhausting than in the Southern, without detracting anything from the superior advantages which we of the South enjoy in the use of African slave-labor.

At the risk of uttering what may be deemed trite or superfluous to many of those who now honor me by their attention, I beg leave to state concisely the fundamental laws, as I conceive them to be, of supply and exhaustion of fertilizing matters to soils and aliment to plants.

All vegetable growth is supported, for a small part, by the alimentary principles in the soil, (or by what we understand as its fertility,) and partly, and for much the larger portion, by matters supplied, either directly or indirectly, from the atmosphere. More than nine-tenths, usually, of the substance of every plant is composed of the same four elements, three of which—oxygen, nitrogen, and carbon—compose the whole atmosphere; the fourth—hydrogen—is one of the constituent parts of water; and, also, as a part of the dissolved water, hydrogen is always present in the atmosphere, and in great quantity. Thus, all these principal elements of plants are superabundant, and always surrounding every growing plant; and from the atmosphere (or through the water in the soil) very much the larger portion of these joint supplies is furnished to plants; and so it is of each particular element, except nitrogen, much the smallest ingredient, and yet the richest and most important of all organic manuring substances, and of all plants. This, for the greater part, if not for all of its small share in plants, it seems, is not generally derived, even partially, from the air, though so abundant therein, but from the soil, or from organic manures given to the soil.

But, though bountiful nature has offered these chief alimentary principles and ingredients of vegetable growth in as inexhaustible profusion as the atmosphere itself which they compose, still, their availability and beneficial use for plants are limited in some measure to man's labors and care to secure their benefits. Thus, for illustration: suppose the natural supplies of food for plants furnished by the atmosphere to be three-fourths of all received, and that one-fourth only of the growth of any crop is derived from the soil and its fertility, still, a strict proportion between the amount of supplies from these two different sources does not the less exist. If the cultivator's land at one time, from its natural or acquired fertility, affords to the growing crop alimentary principles of value to be designated as five, there will be added thereto other alimentary parts, equal to fifteen in value, from the atmosphere. The crop will be made up of, and will contain, the whole twenty parts, of which five only were derived from, and served to reduce by so much, the fertility of the soil. These proportions are stated merely for illustration, and, of course, are inaccurate; but the theory or principle is correct, and the law of fertilization and exhaustion thence deduced is as certainly sound. Then, upon these premises, there is taken from the land, for the support

of the crop, but one-fourth of the aliment derived from all sources for that purpose. And, if no other causes of destruction of fertility were in operation, one green or manuring crop (wholly given to the land, and wholly used as manure) would supply to the field as much of alimentary or fertilizing matter as would be drawn thence by three other crops removed for consumption or sale. But in practice there *are* usually at work important agencies for destruction of fertility, besides the mere supply of aliment to growing crops. Such agencies are the washing off of soluble parts, and even the soil itself, by heavy rains; the hastening of decomposition and waste of organic matter, by frequent tillage processes and changes of exposure; and ploughing or other working of land when too wet, either from rain or want of drainage. Also, a cover of weeds left to rot on the surface, or any crop ploughed under, green or dry, as manure, is subject to more or less waste of its alimentary principles in the course of the ensuing decomposition. Therefore, it is nearer the facts that two years' crops or culture, for market or removal, would require one year's growth of some manuring crop to replace, and to maintain undiminished or increasing the productive power of the field. The poorest, and also the cheapest, of such manuring crops will be the natural or "volunteer" growth of weeds on lands left uncultivated, and not grazed; and the best of all will be furnished in the whole product of a broadcast-sown and entire crop of your own most fertilizing and valuable field peas.

Thus, of each manuring crop, (as of all others,) or of the fertilizing matter thus given to the land, the cultivator has contributed but five parts from the land, or its previous manuring, and the atmosphere has supplied fifteen parts. If, then, the cultivator, by still more increasing his own contributions, will give ten parts of alimentary matter to the land and crop, there will be added thereto from the atmosphere in the same three-fold proportion, or thirty parts, and the whole new productive power will be equal to forty. And if the soil is fitted by its natural constitution, or the artificial change induced by calcareous applications, to fix and retain this double supply of organic matter, the land will not only be made, but will remain of as much increased fertility, under the subsequent like course of receiving one year's product for manure for every two other crops removed. But, on the other hand, if more exhausting culture had been allowed, instead of either increased or maintained production, or if the crops take away more organic matter than nature's three-fold contributions will replace, then a downward progress must begin, and will proceed, whether slowly or quickly, to extreme poverty of the land, its profitless cultivation, and final abandonment. In this, the more usual case, the cultivator's contributions of aliment (obtained from the soil) are reduced from the former value, designated as five, first to four, and next successively to three, two, and finally less than one; and nature keeps equal pace in reducing her proportional supplies from fifteen first to twelve, and so on to nine and six, and less than three parts. So the strongest inducement is offered to enrich, rather than exhaust the soil; for whatever amount of fertility the cultivator shall bestow, or whatever abstraction from a previous rate of supply he shall make, either the gain or the loss will be tripled in the account of supplies from the atmosphere furnished or withheld by nature.

In another and more practical point of view, the loss incurred by

exhausting culture may be plainly exhibited. According to my views, (elsewhere fully stated,*) soils supposed to be properly constituted as to mineral ingredients do not demand, for the maintaining and increasing of their rate of production, more than the resting, or the growth of two years in every five, mainly to be left on the land as manure.

These are the proportions of the five-field rotation, now extensively used on the most improving parts of Virginia. And one of these two years the field is grazed, so that parts of its growth of grass are consumed, instead of all remaining on the field for manure. To meet the same demands, the more Southern planter might leave his field to be covered by its growth of weeds (or natural grasses) one year, (and also to be grazed,) and a broadcast crop of pea-vines to be ploughed under in another, for every three crops of grain and cotton. But the ready answer to this, (and I have heard it many times,) is, "What! lose two crops in every five years? I cannot afford to lose even one." It may be that the planter is so diligent and careful in collecting materials for prepared manure that he can extend a thin and poor application, and in the drills only, over nearly half his cotton field; and perhaps he persuades himself that this application will obviate the necessity for rest and manuring crops to the land.

The result will not fulfil this expectation. But even if it could, the manuring thus given directly by the labor of the planter is more costly than if he would allow time and opportunity for nature to help to manure for him; whether alone, or still better if aided by preparing for and sowing the native pea, to the production of which your climate is so eminently favorable. All the accumulations of leaves raked from the poor pine forest, with the slight additional value which may be derived from the otherwise profitless maintenance of poor cattle, will supply less of food to plants, and at greater cost, than would be furnished by an unmixed growth of peas, all left to serve as manure.

The native or Southern pea, (as it ought to be called,) of such general and extensive culture in this and other Southern States, is the most valuable for manuring crops, and also offers peculiar and great advantages as a rotation crop. The seeds (in common with other peas and beans) are more nutritious, as food for man and beast, than any of the Cereal grains. The other parts of the plant furnish the best and most palatable provender for beasts. They may be so well made in your climate, as a secondary growth under corn, that it is never allowed to be a primary crop, or to have entire possession of the land. It will grow well broadcast, and either in that way, or still better if tilled; and is of an ameliorating and cleansing growth. It is even better than clover as a preparing and manuring crop for wheat. In one or other of the various modes in which the pea-crop may be produced, it may be made to suit well in a rotation with any other crops. Though for a long time I had believed in some of the great advantages of the pea-crop, and had even commenced its culture as a manuring crop, and on a large scale, it was not until I afterwards saw the culture, growth, and uses in South Carolina, that I learned to esti-

* In a recent communication to the Virginia State Agricultural Society, entitled "New Views of the Theory and Laws of Rotation of Crops, and their Practical Application." These views I deem especially applicable to the agricultural condition of South Carolina, and of importance next to the main subject of the present address.

mate its value properly, and perhaps more fully than is done by any who, in this State, avail themselves so largely of some of its benefits. Since, I have made this crop a most important member of my rotation, and its culture, as a manuring crop, has now become general in my neighborhood and is rapidly extending to more distant places. If all the advantages offered by this crop were fully appreciated and availed of, the possession of this plant in your climate would be one of the greatest agricultural blessings of this and the more Southern States. For my individual share of this benefit, stinted as it is by our colder climate, I estimate it as adding, at least, one thousand bushels of wheat annually to my crop.

From this digression to a particular branch, I will now return to the general subject of the neglect of rest and manuring crops for land.

The incessant cultivator does not the less rest, and lose the use of his land, by refusing any cessation of tillage so long as he can avoid it. If such cultivators manure so abundantly that there is no general decline of production, then they do not come under my past remarks and censure. If there be any such, I will only say of their mode of maintaining fertility that it is less effectual, and more costly, than if aided, and substituted in part, by manuring crops and a judicious rotation of crops. But as to many other planters, who, whether slowly or rapidly, are certainly impoverishing their lands, they will, at some future period, be compelled to allow a greater proportion of time for the land to rest, and to greater disadvantage and less profit, than if allowing regularly either one year in three, or two in five. Suppose the land to yield cotton (or sometimes corn) continuously for thirty or even forty years, or, with much manuring, sixty. In such cases, it is true, there were as many crops obtained as the land was kept years for tillage. But after the first few years, the products were declining; and for the last five or ten years, on the general average, they scarcely paid more than the expenses of cultivation. The crops, also, suffered, during the whole time, the evils of a want of rotation, and the land of want of change of condition. At the close, the land *must* be turned out to rest, because manifestly not worth longer cropping. This compelled cessation and rest will continue for twenty, thirty, or forty years, when the land will be again cleared of its second (or perhaps its third) growth of trees; and with this and other extra labors, will be again brought under continued tillage, to be again, and much more speedily, exhausted of its smaller recovered amount of productive power. In this manner, though at long intervals, more than the full proportion of rest required by an improving system of rotation is given to the land, and enforced by its exhaustion; and the manner is such as to make the least return of benefit for the greatest expense incurred, or the respite of the land from cultivation.

My former engagements in South Carolina, and the then especial objects of my investigations and labors, served to make me better acquainted with a large portion of your territory than any other as extensive elsewhere. From that acquaintance was derived the opinion—which I have since asserted and still maintain—that no other as extensive region known to me possesses half so great advantages and resources for agricultural improvement, or more needs the employment of these means. The proper and full use of your wonderfully abundant, rich, and easily accessible marl, and the recent shells and other marine remains, offer the best principal and indispensable means for fertilization, and which

are available for half your territory. Another great resource, and almost as much neglected, is presented in your great inland swamps, now only wide-spread seed beds of disease, pestilence, and death; and which, by drainage, with certainty and great profit, might be converted to dry fields of exuberant fertility. It is true that existing legal obstacles oppose these extensive plans for drainage; but these difficulties might be removed by wise legislation, with great benefit to the interests of all concerned, and improvements might be permitted and invited which would render these now worthless and pestilential swamps as fruitful as the celebrated borders of the Po.

The draining of the inland swamps of rich alluvial soil, together with the general application of marl to these and also to the now cultivated higher ground, would go far to remove the long prevailing unhealthiness to which Lower South Carolina is subject, and which is the only important evil which is not entirely in the power of the inhabitants to remedy. I will not presume to say how far this great evil may be lessened by these works of industry and improvement. But, when so much of your country consists of low and wet swamp, and of partially wet higher lands, and all easy to be drained, it does not seem over-sanguine to suppose that, with such drainage and the general extension of the also sanitary operations of marling and liming, the country would be as much improved in healthiness as in fertility. Such change to greater healthiness has been most marked in my own country, in the extensively marled neighborhoods, even where there have been no considerable draining operations executed or required. This improvement of health is ascribed, by all who have experienced the benefical change, mainly to the sanitary influences of the now calcareous soil.

Your extensive and rich river swamp-lands offer another great object for improvement and increase of agricultural profit and wealth. Even the sandy "pine barrens," now unfit for tillage or for any useful production, other than the magnificent forests which cover them, if made calcareous and put under Bermuda grass, (the curse of tillage lands so infested,) would be made as valuable land for pasturage as the equally barren chalk downs of England.

Your high lands are mostly level, or of gently undulating surface, and easy to till, and the soils generally well suited to your great staple crops—corn and cotton. The navigable rivers which pervade Lower South Carolina, in their number and character, present a remarkable geographical feature, as singular as it is valuable. The main canals required for extensive drainage of the inland swamps would be so many additions to the existing navigable highways. So low are the intervening swamp lands, that nearly all the deep navigable rivers might be connected by canals of level or nearly level water; and in that respect, Lower South Carolina might possess the peculiar facilities of Holland for extensive inland navigation. These connecting canals, by diverting some of the superfluous supply of fresh water of some rivers to others where it is deficient, might, perhaps, serve to extend greatly the present area of tide-covered land capable of being flooded for rice culture. If such canals, mainly for drainage, but serving also, for navigation, were made to connect the Edisto with the Ashley, the Cooper, and the Santee, there would be another incidental advantage as remarkable as it would be valuable. The excavation of the canals through the great

swamps, (and certainly between those stretching from the Ashley nearly to the Santee,) would generally penetrate into marl of the richest quality, lying a few feet below the surface of the swamps. If duly appreciated, this rich calcareous earth, to be used as manure, would go far to reimburse the cost of the excavation; and, if used for lime burning, would furnish good lime, and at one-third of the price of that for which South Carolina has paid and continues to pay millions of dollars to the lime burners of New England. This voluntary tribute, at least, which is one of so many unnecessarily paid by the South to the North, might be ended to the immediate and great profit of both the sellers and the buyers of the substituted lime, made of the abundant, cheap, and excellent native material. The buying of Northern lime by South Carolina and Georgia is as unprofitable and as absurd a procedure as the usage of importing Northern hay. But of these, and of many similar things, we of the South have no right to blame any but ourselves. All the commodities which we import from the Northern States, and which might be more cheaply provided at home, serve, indeed, to make up an enormous amount of annual tribute. But this part of our general burden is fairly and properly levied by Northern enterprise and industry upon Southern listlessness and indolence. Very different, however, is the case as to the far greater proportion of the general amount of tribute paid by Southern to Northern interests, from which we have no defence, because government induces and enforces the payment by the legislative machinery of protecting duties and the indirect bounty system. But I am straying from my designed subject—the improvement of Southern agriculture to its governmental and political oppression. Putting aside all speculative and untried subjects and modes of improvement, and counting upon nothing more than the proper use of your calcareous manures and judicious tillage, and the early results of both, and supposing that your country should be so benefited only in the same degree as has been the small portion of mine, already marled or limed, the most moderate estimate of the agricultural values so to be created would now appear to you so greatly exaggerated as to be altogether incredible. But however much I would desire to avoid the position of a discredited witness, I will not be restrained by that fear from stating general results, which are notorious in Virginia, and to sustain the truth of which thousands of particular facts could be adduced. These results, susceptible of clear proof, or exhibited by official documents, are, that thousands of farms have been doubled or tripled, and some quadrupled in production, and the general wealth of their proprietors as much increased. The assessed values of marled lands have been increased by many millions of dollars, while those of similar lands, not so treated, have continued to decline as all did before; and the treasury of the commonwealth is already benefited by many thousands of dollars received annually from the counties containing these improved lands, and derived from them; while the revenue from lands of the neighboring, and before similar counties, is still decreasing.

So far I have spoken as to benefits which have already occurred, and which are unquestionable, and which have been derived from resources and facilities for improvement not to be compared, in amount and value, with those of South Carolina. I have elsewhere estimated the possible future and full fruition of this system of improvement, in Lower Virginia only, at $500,000,000 of increased pecuniary value of capital thereby to

be created. The full employment of your much greater resources of this kind, and over as wide a surface, would not be worth less. Then your other great resources, which have been named, but not estimated, would be so much more in addition.

But agricultural production and pecuniary values are not the only or the greatest gains; and though others rest upon opinion only, and are incapable of being measured, their existence and their value are not the less acknowledged by all judicious observers in our country, most improved in agricultural production by calcareous manures. The improvement of health has been mentioned; the improvement of economical and social habits, morals, and refinement, and better education for the growing generation, have been sure consequences of greatly increased and enduring agricultural profits; and these moral results will hereafter be increased in full proportion to the physical and industrial producing causes. Population, though a late effect, is already sensibly advanced by these agricultural causes. The strength—physical, intellectual, and moral—as well as the wealth and revenue of the commonwealth of Virginia, will soon derive new and great increase from the growing improvement of that one and smallest of the great divisions of her territory, which was the poorest by natural constitution, still more the poorest by long exhausting tillage, its best population gone, or going away, and the remaining portion sinking into apathy and degradation, and having no hope left, except that which was almost universally entertained, of fleeing from the ruined country, and renewing the like work of destruction on the fertile lands of the Far West. Terms of reproach and contempt (once not undeserved) have been so long and so freely bestowed on this tide-water region of Virginia, and had become so fixed by use, that it will be long before they will cease to be deemed applicable, or before many persons, who now know this region only by the memory of former report, will learn that it is not altogether land of galled and gullied slopes, or broomsedge covered fields, over whose impoverished and dwindling population indolence and malarious disease contend for mastery.

From these matters, referred to for proof or illustration, I return to my main subject, more immediately connected with, and more likely to be interesting to, my auditors.

There is not one of the industrial classes of mankind more estimable for private worth and social virtue than the landholders and cultivators of the Southern States. With them, unbounded hospitality is so universal that it is not a distinguishing virtue; and, in truth, this virtue has been carried to such excess as to become of vicious tendency. Honorable, high-minded, kindly in feeling and action, both to neighbors and to strangers, ready to sacrifice self-interest for the public weal—such are ordinary qualities and characteristics of Southern planters. Many of the most intelligent men of this generally intelligent class are ready enough to accept, and to apply to themselves and their fellow-planters the name of "land-killers." But, while thus admitting, or even assuming, this term of jocose reproach, they have not deemed as censurable or injurious their conduct on which this reproach was predicated. They have regarded their "land-killing" policy and practice merely as affecting their own personal and individual interests; and, if judged by their continued action, they must believe that their interests are thereby best promoted.

be the general result, as it seems that marling has languished, if not ceased in general, after a few faint efforts.* But I infer that the main and usual cause of supposed failure or of inconsiderable benefit, has been the same prevailing bad practice, before denounced, of incessant or at least much too frequent tillage, which does not permit the fields to receive and retain organic matter from their own growths especially. This cause had operated on nearly all the trials of marl made previous to my service in South Carolina. Of all such cases of alleged failure that I was enabled to see and investigate the circumstances, the causes were such as I now suppose of the still later failures. These cases of failure and of disappointment, and the known causes, were brought fully to view in my report of the agricultural survey; and from the more extended remarks, I will quote a short passage, to show my then opinion of the facts and the causes of previous failures, and my earnest warning against the general course pursued. After reciting the general facts of failure of the previous trials of marling, I proceeded in these words: "Can any opponents of marling desire more full admissions than these? And yet they all serve to illustrate what I have continually striven to impress, *that, without vegetable matter to combine with, calcareous manures will be of little value.* But, on the other hand, I have heard of no trial of marl on land in proper condition—that is, recently and sufficiently rested, and thereby provided with vegetable matter—in which the effect has not been very great *on the first crop.* And three or four of such results, only, would be enough to explain the cause, (of failure in all other cases,) and to prevent all inferences unfavorable to marling, if from a hundred failures of early efforts under reverse circumstances."

Then followed particular statements of two different experiments, carefully made that year, (and the circumstances noted at my request,) of marling on new land, and therefore not exhausted of its vegetable matter, and in which the products (which were of cotton) were nearly doubled in the first year of the application.

Here, then, even in the few lines quoted from the much more full precepts to the same purport, there is full evidence of my having stated, in advance of all later trials, the sure cause of failure; and, in the warning against that cause, I may claim to have predicted all later failures of like occurrence. And if there had been thousands of failures, preceded and accompanied by very frequent and exhausting tillage, all of them would but the more strongly confirm my long entertained and often-expressed opinions and instructions as to the action of calcareous manures; and all such cases would not detract a little from the alleged available values. When urging the use of lime, I have never omitted to state that it gave no fertility of itself or by direct action, and that vegetable matter, in sufficient quantity and in conjunction, was essential to the beneficial operation of calcareous manures. The required organic matter may be supplied mainly in the growth of the land to be improved. But it *must* be supplied in some form, and in sufficient quantity; and, also, should be, in part, present in advance of the use of calcareous manures, to secure their best early effects.

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*There is, however, one important case known to me, of at least partial exceptions to the general rule of failure of marling in South Carolina, in the very extensive and also profitable labors and improvements of Governor Hammond, on his estate bordering on the Savannah.

Planters of South Carolina: I have offered to you in plain and unvarnished language, and, possibly, it may be in ungracious and distasteful terms, the last advice and admonition that I can expect to utter to you or to any similar audience. My burden of years, and infirmities much greater than even suited to my age, admonish me that my labors must soon close. I would deem it a reward of more value to me than will be the short remainder of my life, if you and your fellow-laborers, even at this late time, (in reference to myself,) would heed my words and fully profit by them. It is but little that a private individual can do to warrant to a great commonwealth or community the beneficial results predicated upon stated premises and conditions; but, so perfect is my confidence in the general results I have predicted, that I would willingly hazard upon the issue all that I have in property, reputation, and even life itself. For illustration, and in mercantile or business language: If I possessed hundreds of millions of dollars, to that full amount, for a premium of 10 per cent., I would insure as much clear profit to South Carolina, to be gained by conforming to my directions, for saving and increasing the fertility of her soil. As, however, it is impossible for me to offer any such guarantee, and for me either to incur risk of loss or to derive pecuniary gain from the results, I can only offer my earnest verbal assurances of your available gain, as great and as sure to be obtained by your pursuing a proper course of improvement as will be the growing loss and eventual ruin of your country and humiliation of its people if the long existing system of exhausting culture is not abandoned. It is not merely my feeble voice and my questionable personal testimony, but also thousands of unquestionable facts, and the sure experience and realized profits of thousands of farmers, which offer to your acceptance the highest agricultural prosperity in exchange for present decline and approaching exhaustion of the remaining fertility of your land. Choose, and choose quickly! And remember, as my last warning, that your decision will be between your purchasing, at equal rates of price, either wealth and general prosperity, of value exceeding all present power of computation, or ruin, desitution, and the lowest degradation to which the country of a free and noble-minded people can possibly be subjected.

Their error in regard to their own interests, great as it may be, is incomparably less than the mistake as to other and general interests not being thus affected. As I have already admitted, individuals may acquire wealth by this system of impoverishing culture, though the amount of accumulation is still much abated by the attendant waste of fertility. But with the impoverishment of its soil, a country, a people, must necessarily and equally be impoverished. Individual planters may desert the fields they have exhausted in South Carolina, and find new and fertile lands to exhaust in Alabama. And when the like work of waste and desolation is completed in Alabama, the spoilers (whether with or without retaining a portion of the spoils) may still proceed to Texas or to California. But South Carolina and Alabama must, nevertheless, suffer and pay the full penalty of all the impoverishment so produced. The people who remain to constitute these States respectively as communities, are not spared one tittle of the enormous evils produced—not only those of their own destructive labors, but of all the like and previous labors of their fellow-citizens and predecessors who had fled from the ruin which they had helped to produce. And these evils to the community and to posterity, greater than could be effected by the most powerful and malignant foreign enemies of any country, are the regular and deliberate work of benevolent and intelligent men, of worthy citizens, and true lovers of their country!

I will not pursue this uninviting theme to its end—that lowest depression which surely awaits every country and people subjected to the effects of the "land-killing" policy. The actual extent of progress toward that end throughout the Southern States ought to be sufficiently appalling to produce a thorough change of procedure and reformation of the agricultural system of the South.

In addition to all increase of the other benefits of agricultural improvement which have been cited—pecuniary, social, intellectual, and moral—there would be an equal increase of political power, both at home and abroad, which, at this and the near approaching time, would be especially important to the well-being and the defence of the Southern States, and the preservation of their yet remaining rights and always vital interests. If Virginia, South Carolina, and the other older slaveholding States had never been reduced in productiveness, but, on the contrary, had been improved according to their capacity, they would have retained nearly all the population that they have lost by emigration; and that retained population, with its increase, would have given them more than a doubled number of representatives in the Congress of the United States. This greater strength would have afforded abundant legislative safeguards against the plunderings and oppressions of tariffs, to protect Northern interests—compromises, so called, to swell Northern power; pension and boundary laws, for the same purposes; and all such acts to the injury of the South, effected by the great legislative strength of the now more powerful, and, to us, the hostile and predatory States of the Confederacy. Even after Virginia, with more than Esau-like fatuity, had sacrificed her magnificent Northwestern Territory, which now constitutes five great and fertile States, and a surplus, to make, by legislative fraud, a large part of a sixth State, and all of which are now among the most hostile to the rights of the people of the South—if Virginia had merely retained and improved the fertility of her present reduced sur-

face, her people would not have removed. Their descendants would now be south of the Ohio, ready and able to maintain the rights of the Southern States, instead of a large proportion, as now, serving to swell the numbers and give efficient power to our most malignant enemies. The loss of both political and military strength to Virginia and South Carolina is not less than all other losses, the certain consequences of the impoverishment of their soil.*

If it were possible that, for all Lower South Carolina, the system of improvement could be directed by one mind and will, as much as the operations of any one great individual estate, the most magnificent results could be obtained with great and certain profit, and in a few years. Without any additional labor or capital more than now possessed for beginning the improvements, and with only the subsequent increase of means, which would be supplied by the clear profits of the improvements as they became productive, most of the lands accessible to marl or lime could be covered by these manures in ten years. In twenty years from this day, all such lands could be thus improved, and by that time might yield doubled or tripled general products, and would exhibit a proportionally greater increase of value as capital. The new clear profits of this one great improvement would be enough in amount to effect all the practicable drainage of inland and river swamps in twenty years more; or, in that additional time, the increased revenue of the State treasury, from these new sources only, would suffice to construct all the great works of drainage, which would be beyond the means of individual proprietors.

In all opinions expressed as to the values and effects of the agricultural improvements proposed for South Carolina, my data are the experienced and unquestionable results of like labors in Virginia. The legitimate deduction, and the only one for untried operations, is, that like causes will produce like effects in both these different localities. I cannot conceive any reason, founded on existing differences of climate, soil, or subjects of culture, that can make calcareous manures less efficient or less profitable with you than with us. Nevertheless, I have learned, from mere rumor, that, in the small extension of their use, by new operators, which occurred here, there was no general and important benefit obtained. And such, I must infer, was the conclusion reached by nearly all the makers and observers of these trials, from the irresistible though negative evidence (which only is before me) that nothing considerable of such improvements, or of public notoriety, has been effected in latter years. In the absence of all particular information of the actual trials, their results, and the accompanying circumstances, of course I cannot pretend or be expected to explain the causes of disappointment which must

* A condition made by the government of Virginia, in the act of cession to the United States of all her Northwestern Territory, was, that this territory should afterwards be divided into not more than five new States. Five have already been carved out of this great domain: Ohio, Indiana, Illinois, Michigan, and Wisconsin, and a space of 22,336 square miles remains, in the new Territory of Minnesota, which will hereafter constitute so much of another State, in violation of the act of cession by Virginia, and of the faith of the present Federal Government; and in which space, with all the Northwestern Territory, slavery was interdicted by the ordinance of 1787 of the Confederation. This space of 22,336 square miles, which ought to have been included in the five anti-slavery States already formed, but which will go to constitute a sixth, is nearly as large as South Carolina, and larger, by nearly 1,000 square miles, than the united surfaces of New Hampshire, Massachusetts, and Connecticut.

VII.

PRIZE ESSAY.

THE AGRICULTURAL VALUE OF PHOSPHATE OF LIME.

BY JOSEPH HARRIS, ROCHESTER, NEW YORK.

[From the Transactions of the New York State Agricultural Society.]

Phosphorus, an element never found in nature in an uncombined state, but usually manufactured from bones, is semi transparent of nearly the consistence of wax; internally of a reddish or flesh color, but coated with a white film, arising from its partial decomposition. It so strongly attracts oxygen from the air as to become slowly decomposed at a very low temperature; and hence it is usually kept under water. When ignited, it gives off dense white fumes. This is phosphoric acid, and it is in form united with lime, iron, lead, copper, and other bases with which it is usually found. It enters into the composition of all plants and animals, and is found in all soils not absolutely sterile; the inorganic parts of the bones of all animals are composed principally of this acid united with lime, called phosphate of lime; and wheat, Indian corn, Timothy, and other Cereal grains contain from forty to fifty per cent. in their ashes. It will easily be seen that it is a substance of vast importance in an agricultural point of view; and when it is understood that no plant will grow on a soil destitute of it; that no soil, however fertile, contains bu a comparatively small amount, and that in the bones and flesh of animals, and in the grains of wheat, Indian corn, and Timothy, it is annually exported from the soil in large quantities never to return, its real value and importance will be clearly perceived. The whole of the phosphate of lime which exists in the bones of man and animals must have been originally in the soil, and, being taken up by plants, was by them conveyed into the animal organism. Under the system of agriculture commonly adopted, phosphate of lime is continually being abstracted from the soil, and, unless an equivalent portion to that which is taken is liberated from the soil by annual decomposition, or is returned by the purchase of manure containing it, a gradual diminution of fertility must follow. Those engaged in the pursuit of agriculture cannot but derive some benefit from a knowledge of the chemical properties and agricultural uses of phosphate of lime.

As is usually the case, practice got the start of science in the use of bones as a manure, and, without knowing why, the farmer found them of great value to his soil. It is said they were first used on the natural grass dairy meadows of Cheshire, England, where, from the large amount

annually taken from the soil in cheese and the bones and flesh of animals, the soil had become exhausted of phosphoric acid; their effect was surprisingly beneficial. They were used with profit at a cost of from $20 to $60 per acre. Few turnips were then grown; but the value of this crop being acknowledged, great efforts were made to extend its culture, the land owners in many cases compelling the tenant farmer to grow a certain number of acres. Bones were found to be the best manure that could be applied to this crop, their beneficial effect lasting for many years. I have seen a crop of turnips three times as large on a portion of a field where bones had been applied 12 years previous as on another part of the same field where none had been used, though treated similarly in every other respect. It is often said that soil dressed with bones never forgot it when turnips were sown; but this opinion is formed from the lasting effects of roughly-broken bones, as first used at the rate of one hundred bushels per acre; it was soon found that if they were finely ground, a much smaller quantity would suffice, though the benefit would not be so lasting. The reason of this is found in the fact, that plants cannot take anything from the soil but in a state of solution. Now, bones in their natural state are insoluble in water, and have first to decompose, and be incorporated with the soil, before they can nourish plants; but, if finely ground, they are easily intimately mixed with the soil, where, being attacked by its acids, they readily decompose, and are more speedily rendered in a fit state for assimilation by the plants. Twenty bushels of dust will in this way be more beneficial, apparently, than 100 bushels of merely crushed bones.

The reason why boiled bones are supposed to be better than unboiled is the same; they have absorbed considerable water, and are, in consequence, more speedily decomposed in the soil, and taken up by the plants. Common experience proved the value of bones as a manure, but science had to explain the cause of their beneficial action. This science not only did, but, having done so, discovered a plan to decompose these bones before they were applied to the soil, thus concentrating the effect into one, which would have extended over twenty years, or producing a better effect for one year, with a twentieth part of the bones.

There are several phosphoric acid and lime compounds known to chemists; but the only two that concern us at present are the neutral phosphate of lime, often called the bone earth phosphate, because it forms the chief earthly ingredient of bones, and the bi-phosphate, or, as it is called in commerce, super-phosphate, or acid phosphate of lime.

Pure neutral phosphate of lime contains, in 100 pounds—

Phosphoric acid	48½
Lime	51½
	100

The bi-phosphate, or acid phosphate of lime, is composed of—

Phosphoric acid	71½
Lime	28½
	100

The neutral phosphate of lime is all but insoluble in water; but the bi-phosphate is readily soluble. Now, what science has discovered is the method of cheaply converting the insoluble phosphate into the soluble bi-phosphate; and, simple as it may seem, this discovery has benefited agriculture more than all others combined.

Phosphate of lime consists of two atoms of phosphoric acid and two of lime; and bi-phosphate has three atoms of phosphoric acid combined with one of lime. Now, to convert the one into the other, we have either to add phosphoric acid, or take away lime; the latter is the only way practical in a manufactory, though the former can be done in the laboratory. Phosphoric being what chemists term a weak acid, sulphuric acid will take away its lime, setting the phosphoric acid free. If but a small quantity of acid is applied, it will unite with a portion of the lime, forming sulphate of lime, and setting free its phosphoric acid, which will unite with the remaining phosphate of lime, forming the required soluble bi phosphate. If sufficient acid is not added to convert the whole into bi phosphate, a portion of the neutral phosphate will remain untouched. If more than is required to convert the whole into bi phosphate is applied, a portion of the phosphoric acid will be liberated, and remain uncombined, and by adding sufficient acid the whole may be set free, and the result of the mixture would be sulphate of lime and free phosphoric acid.

To exemplify this, let us suppose 100 pounds of the pure phosphate of lime taken; this would contain 48½ pounds phosphoric acid. Now, then, if 71¼ of phosphoric acid make 100 of bi phosphate of lime, 48½ will make 68. Therefore, the 100 pounds of pure phosphate of lime can be converted into 68 pounds of bi phosphate of lime, and this is accomplished by abstracting 32 pounds of lime. The quantity of pure sulphuric acid required to effect this is easily calculated.

Sulphate of lime, or plaster, is composed of—

Lime	41½
Sulphate acid	58½
	100

So that 32 pounds of lime would require 45 pounds sulphuric acid to convert it into sulphate of lime. Therefore, to convert 100 pounds of neutral phosphate of lime into bi-phosphate would require 45 pounds of pure sulphuric acid. If we take away the 32 pounds of lime, we should have, as the result, 68 pounds bi-phosphate, and 77 pounds of sulphate of lime.

The composition of bones varies considerably, according to the age and kind of animals—less phosphate of lime, and more gelatine, being found in an older animal; but, on an average, 100 parts of raw bones may be estimated as containing—

Water	11 lbs
Phosphate of lime	45 "
Fat and gelatine	38 "
Carbonate of lime	4 "
Alkaline chlorides and sulphates	2 "
	100

It will be seen that, besides the phosphate of lime, bones contain thirty-eight per cent. of organic matter, so that, in judging of the results of experiments with fresh bones, it is necessary to take this into account, and not attribute all the benefit to the phosphate. To avoid any discrepancies of this kind, we will present the reader with a few results selected from experiments made at Rothamsted farm, Herts, England, by Mr. Lawes and Dr. Gilbert, in which calcined bones were used containing about ninety per cent. of phosphate of lime.

TABLE I.—TURNIP EXPERIMENTS.

Description of manure.	Bulk, per acre.				Leaf, per acre.			
	Tons.	*cwt.*	*qrs.*	*lbs.*	*Tons.*	*cwt.*	*qrs.*	*lbs.*
Unmanured	0	13	2	24	0	14	1	4
12 cwt. sulphate lime, the refuse of tartaric acid manufacture	5	13	2	24	2	19	3	12
400 pounds calcined bone dust	10	4	0	6	3	12	3	12
400 pounds calcined bone dust and muriatic acid, equivalent to 268 pounds sulphuric acid (sp. gr. 1.71)	9	9	1	12	4	6	3	12
400 pounds calcined bone dust and 134 pounds sulphuric acid (sp. gr. 17)	12	18	2	6	3	16	3	2
400 pounds calcined bone dust and 268 pounds sulphuric acid	13	11	0	0	4	14	1	4
400 pounds calcined bone dust, 268 pounds sulphuric acid, and 134 pounds common salt	1	10	0	4	6	11	0	10
400 pounds calcined bone dust and 400 pounds sulphuric acid	13	2	2	24	4	5	0	16

The most striking feature in the above selection is the great difference between the unmanured and the manured lots. It is seen that sulphate of lime or plaster increases the amount five tons per acre, though yielding a crop which, in common practice, would not be considered remunerative. But whenever phosphate of lime is used, the effect is greatly beneficial. The difference between the decomposed and undecomposed is not so striking as I should anticipate; but the fact of the bones having been burnt and in a state of minute subdivision, making them more readily soluble, would render them much more efficacious than bone dust as generally applied. An increase of sulphuric acid from 134 pounds to 268 pounds, with 400 pounds of bones in each case, gives an increase of 12½ cwt. of bulk and 17½ cwt. of leaf; but an increase from 268 to 400 pounds of sulphuric acid, with the same amount of bones in either case, is attended with a diminution of 8½ cwt. of bulk, and 11 cwt. of leaf. This will indicate the amount of acid best to use, and shows, not only the necessity of having the whole phosphate decomposed, but that it is injurious to have phosphoric acid free by using an excess of sulphuric acid; but it is the former, rather than the latter, evil that farmers need be on their guard against in purchasing super-phosphate of lime. Mr. Lawes's experiments on turnips were commenced in 1843, and have been continued to the present time, during which many interesting and important facts relative to the turnip, and the position it occupies in English agriculture, have been brought to light, which it would be inconsistent with the ob-

ject of the present essay to discuss; but it may be mentioned, as amongst the most important conclusions, that, if in ordinary agriculture the turnip is supplied with available phosphate of lime, no other substance need be employed of a mineral or alkaline nature; that ammonia is not essential; but that carbon, in conjunction with phosphate, will give an increased crop over the phosphate alone.

The soil on which these experiments were made is a somewhat heavy loam, unsuitable for turnips, which delight in a light, sandy loam; so that the above weights per acre may be considered as much under the amount usually obtained on soils well adapted to their growth.

The following result was obtained by Mr. Pusey in the regular course of tillage; the bulbs *only* are given:

	Tons.	Cwt.
No manure, per acre	1	00
Five and a quarter bushels super-phosphate of lime, per acre	16	12¾

Great as this increase may appear, yet I think it may be taken as a correct estimate of the benefit usually derived from the application of super-phosphate of lime to the turnip crop. But it is as a manure for wheat that we should naturally look for the greatest benefit from super-phosphate, inasmuch as this grain contains such a large amount of phosphoric acid. Mr. Lawes's experiments on wheat, on a soil similar to the one on which the turnip-experiments were made, and which had been agriculturally exhausted by the growth and removal of four grain-crops, without any manure previous to the commencement of the experiments, are very conclusive on this point. That the first year gave the following result, which may be taken as an indication of the results of after-experiments: An acre, unmanured, gave 16¾ bushels, and 1,120 pounds straw; with 700 pounds super phosphate of lime, manufactured from calcined bone dust, 16¾ bushels and 1,116 pounds of straw.

The following experiments, in the same year, (1844,) and on the same field, prove that the failure of the super-phosphate was not owing to a deficiency of other mineral manures or ash constituents:

TABLE II.—WHEAT EXPERIMENTS.

Description of manures.	Dressed grain per acre.		Total grain per acre.	Straw per acre.
	u sh.	*pks.*	*Pounds.*	*Pounds.*
1. Unmanured	16	0	923	1,120
2. 14 tons farm yard dung	22	0	1,276	1,476
3. Ashes of 14 tons farm yard dung	16	0	880	1,104
4. Minimum produce of nine plots, with artificial mineral manures, viz., 350 pounds super-phosphate of lime and 364 pounds phosphate of potash	16	1	980	1,160
5. Maximum produce of nine plots, with artificial mineral manures, viz., 350 pounds super-phosphate of lime, 168 pounds phosphate of magnesia, 150 pounds phosphate of potash, and 112 pounds silicate of potash	17	3¼	1,096	1,240
6. Mean of nine plots, with artificial mineral manures	16	3¾	4,009	1,155
7. Mean of three plots, with artificial mineral manures and 65 pounds sulphate of ammonia	21	0	1,275	1,423

This table affords pretty clear indications of the requirements of the wheat crop, mineral manures or ash constituents producing no good results, while the addition of sixty-five pounds sulphate of ammonia gives an increase of five bushels—nearly equal to that obtained by fourteen tons barn-yard manure. These experiments have been continued to the present time, and are now being carried on, with unabated zeal, at an annual cost of fifteen thousand dollars. The scrupulous accuracy and scientific abilities of the experimenters render their results worthy of the fullest confidence.

The following table exhibits some selected results, up to the year 1850, on the same plot of land each year:

TABLE III.—WHEAT EXPERIMENTS.

Harvest.	Description of manure.	Actual produce, per acre.					
		Dressed grain, in bushels and pecks.		Total grain, in pounds.		Straw, in pounds.	
		Unmanured	Manured.	Unmanured.	Manured.	Unmanured.	Manured.
		Bush. pks.	*Bush. pks*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1844....	Super-phosphate of lime 560 pounds, and silicate of potash 220 pounds.....	16 0	16 $3\frac{3}{4}$	923	1,008	1,120	1,112
1845...	Sulphate of ammonia 168 pounds, and muriate of ammonia 168 pounds, top-dressed at four times....	23 $0\frac{1}{4}$	31 $3\frac{1}{4}$	1,444	1,980	2,712	4,266
1846....	Sulphate of ammonia 224 pounds	17 $3\frac{3}{4}$	27 $1\frac{1}{2}$	1,207	1,850	1,513	1,455
1847....	Sulphate of ammonia 150 pounds, and muriate of ammonia 150 pounds.....	16 $3\frac{1}{2}$	25 3	1,123	1,702	1,902	2,874
1848....	Sulphate of ammonia 150 pounds, and muriate of ammonia 150 pounds.....	14 3	19 1	952	1,334	1,712	2,926
1849....	Sulphate of ammonia 200 pounds, and muriate of ammonia 200 pounds.....	19 1	32 2	1,227	2,141	1,614	2,964
1850....	Sulphate of ammonia 200 pounds, and muriate of ammonia 200 pounds.....	15 $3\frac{1}{4}$	26 $3\frac{1}{2}$	1,000	4,721	1,719	1,949
	Total in seven years.....	123 $0\frac{3}{4}$	108 2	7,876	11,736	12,292	17,546
	Mean per annum.....	17 $2\frac{3}{4}$	25 $3\frac{1}{4}$	1,125	1,670	1,756	2,507

It is seen that in 1844, with mineral manures and no ammonia, the increase of grain over the unmanured plot is less than one bushel, and no increase of straw; while for the next five consecutive years, when ammonia was supplied, and no minerals, there is an average increase of ten bushels per acre grain, and about half as much again straw. From these experiments we may safely draw the following conclusions: That the application of mineral manures alone to a soil exhausted by the growth of Cereals, is attended with no benefit to the wheat crop; that it does not enable the plant to obtain its nitrogen or carbon from the atmosphere, but that, in this exhausted soil, the application of ammonia alone produced good crops, enabling the plant to assimilate the minerals of the soil, and to obtain carbon from the atmosphere. That we could not long obtain such an increase by the sole application of ammonia, is pretty certain, for, however large an amount of minerals there may be in a soil, by annually growing large crops of wheat, and removing the entire produce, they must ultimately be exhaused; indeed, it is seen on the above table that on the fourth year (1848) of their supply, ammoniacal salts do not give their accustomed increase—thus showing that there was a deficiency of minerals.

A plot in the same field, manured with the same quantity of ammonia, and a good supply of super-phosphate of lime, potash, soda, and sulphate of magnesia, gave a yield of 26½ bushels, and 3,956 lbs. of straw.

The next year, however, there was as large a yield without as with minerals, the same amount of ammonia being used in each case; and in 1850, the increase of minerals and ammonia over ammonia alone was but two bushels. From this we conclude that the deficient yield in 1848 was not from exhaustion of minerals, in the strict meaning of the term, but from a deficient disintegration; in other words, that the minerals were present, but not in a state for assimilation by the plant, even with a sufficiency of ammonia in the soil.

The following selected results, from the same experiments, on the same plot of land each year, are interesting, and conform to the opinions already expressed. They show how intimately any increase of wheat is connected with a supply of ammonia in the soil, and also that the ammoniacal salts are all taken up the first year:

TABLE IV.—WHEAT EXPERIMENTS.

Harvest.	Description of manures.	Actual produce, per acre.					
		Dressed grain.				Straw.	
		Unmanured.		Ma ured.		Unmanured.	Manured.
		Bush.	*pks.*	*Bush.*	*pks.*	*Pounds.*	*Pounds.*
1844....	Sulphate of lime 560 pounds, and silicate of potash 220 pounds	16	0	16	3¾	1,120	1,112
1845....	Sulphate of ammonia 168 pounds, and muriate of ammonia 168 pounds	23	0¾	31	3¼	2,712	4,266
1846....	Top dressed at four times; no manure applied	17	3¾	17	2¼	1,513	1,455
1847....	Sulphate of ammonia 150 pounds, muriate of ammonia 150 pounds, pearl ash 300 pounds, soda ash 200 pounds, and sulphate of magnesia 100 pounds	16	3½	25	2¾	1,972	2,874
1848....	Calcined bone dust 200 pounds, sulphuric acid 150 pounds, and 150 pounds each sulphate and muriate of ammonia	14	3	25	0¼	1,712	2,926
1849....	Sulphate of ammonia 200 pounds, and muriate of ammonia 200 pounds	19	1	32	2¾	1,614	2,964
1850....	Pearl ash 300 pounds, soda ash 200 pounds, sulphate of magnesia 100 pounds, bone ash 200 pounds, and sulphuric acid 150 pounds	15	3¼	17	3¾	1,719	1,949
	Total	123	3¾	167	3	12,292	17,546
	Mean	17	2¾	23	3¾	1,756	2,506

Can any one, after carefully studying the above results, avoid concluding that ammonia is the one thing needful for the growth of wheat, in agricultural quantity? Whenever it is applied with or without minerals, there is an increase of wheat and straw; when it is not applied, though every kind of mineral be sown, there is scarcely any increase over the unmanured acre.

The following table gives the results of the application of 14 tons of barn-yard manure, each year, on the same acre of land, as compared with that of the continuously-unmanured acre:

TABLE V.—WHEAT EXPERIMENTS.

Harvest.	Dressed grain, in bushels and pecks.		Total weight of grain in pounds.		Straw, per acre, in pounds.	
	Unmanured.	Manured.	Unmanured.	Manured.	Unmanured.	Manured.
	Bush. pks.	*Bush. pks.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1844.....	16 0	22 0	923	1,267	1,120	1,476
1845.....	23 0¾	32 0½	1,411	1,967	2,712	3,915
1846.....	17 3¾	27 0¾	1,207	1,826	1,513	2,454
1847.....	16 3½	29 3¾	1,123	1,981	1,902	3,628
1848.....	14 3	25 2¾	952	1,705	1,712	3,041
1849.....	19 1	30 3	1,227	2,053	1,614	3,005
1850.....	15 3¼	28 2½	1,000	1,861	1,719	3,245
Total...	123 3¾	196 1¼	7,873	12,660	12,292	20,764
Mean...	17 2¾	28 0¼	1,125	1,809	1,756	2,960

This amount of farm-yard manure contains a sufficient supply of minerals for a very large crop of wheat, besides a large amount of carbon and some nitrogen; yet the average increase, taking the last six years, is within one bushel per acre of that obtained by the use of ammoniacal salts alone, and may be considered as dependent on the ammonia supplied in the manure, irrespective of the other constituents. The 98 tons of farm-yard manure supplied in 7 years give a total of 73 bushels dressed grain and 8,472 pounds straw, or three fourths of a bushel of grain and 86 pounds of straw for every ton of manure supplied. I should like to give several more interesting results illustrating this subject, but must forbear, as I have already overtaxed the patience of the reader with "these pesty tables." I have the greatest confidence in the accuracy of these experiments, and in the applicability of them to British agriculture, where farmers never dream of obtaining profitable crops without manure, and where, from the system of culture practised, minerals relatively to other constituents will accumulate in the soil; but, in America, where farmers have in many instances exported all the hay, wheat, and corn for many years, with a produce not exceeding the yields of the unmanured acre in Mr. Lawes's experiments, it is but reasonable to suppose that many of the mineral elements, especially phosphoric acid, are deficient. In cases, too, where the crops have been increased by

means of ploughing in clover and other manures grown on the soil, thus supplying nitrogen without any minerals, the soil would so much the sooner be exhausted of the mineral constituents of the plants exported, as the plants usually grown here contain relatively to potash and soda, &c., most phosporic acid. Potatoes and Timothy are exceptions; and, where these crops have been cultivated to a great extent, it is possible the soil may be deficient of potash rather than phosphoric acid; and in rearing or even fattening cattle, much more phosphoric acid than potash and soda is exported, and the soil originally, in most cases, as proved by analysis, contains less phosphoric acid than any other mineral ingredient; it may be safely concluded that, if the soil is deficient of any mineral ingredient, it is phosphoric acid; and, as plants will not grow without it, and there has been none supplied, it would be impossible to exhaust the soil of potash and soda, &c.

Admitting, then, that the soil is deficient in phosphate of lime, what would be the effect of an application of this substance? We have seen that, where there was an excess of minerals and no ammonia in the soil, the average yield of wheat was 17 bushels per acre; ammonia sufficient to produce this quantity being derived from the atmosphere, and supplied to the plants by rain. The variation of from 15 to 23 bushels on the no-manure plot, during the several years, was caused by a less or greater quantity of rain falling during the growing season. The effect, therefore, of the application of phosphate of lime to a soil exhausted of it by the growth of Cereals, would be to raise the crop to that yield which would be obtained from a soil having sufficient minerals but no nitrogen in the soil. This would vary, according to the amount of rain, from 15 to 23 bushels, provided the soil be well cultivated and clean; and if this be considered a remunerative yield, a soil adapted by texture to the growth of wheat may, by supplying annually fifty pounds of phosphate of lime, and a few bushels of wood ashes per acre, be made to produce this amount annually forever, provided the soil be well cultivated.

But we conceive that such a yield will not pay the farmer, and it becomes necessary to adopt some means to increase it. Phosphate of lime, or any mineral manure we have seen, will not do this without a supply of ammonia in the soil; the question is, then, how to obtain this ammonia, and what benefit will be derived from its application. From the above experiments and a great many more we have not been able to give, Mr. Lawes concludes that five pounds of nitrogen are required to produce each extra bushel of grain, over and above the unaided produce of the soil. This, too, accords with the general experience of farmers in the habit of using guano, sulphate of ammonia, &c., in common practice; 300 pounds of good guano containing 17 per cent. nitrogen, giving an increase over the undressed acre of ten bushels.

It has been supposed that, as a bushel of wheat contained about one pound nitrogen, if that amount was supplied in the manure, it would be amply sufficient. But Mr. Lawes's experiments are so very conclusive on this point, that we are obliged to conclude that wheat is a nitrogen destroying plant, or that much more nitrogen is necessary for its growth than is contained in the plant when grown. As a corroboration of this point, we may mention that the experiments of Draper, Dauben, and De Saussure prove that nitrogen is actually given off by some plants during their growth. We may conclude, then, that five pounds of nitro-

gen are necessary for the growth of a bushel of wheat, and it is probable that other grains of the same order—such as Indian corn, barley, oats, Timothy, and rye, also—require more nitrogen for their growth than they contain when fully matured. Now, it is obvious that, when soil is tilled for the first time, and there is a large amount of nitrogen in it which has accumulated by the fall of leaves, &c., for ages, for a few years great crops will be obtained, provided the land is well tilled; but that these nitrogen destroying plants would very soon, relatively to other constituents, exhaust the soil of nitrogen, and the crop would be dependent on that supplied in the rain, or in applied manure. Soils are then, under ordinary cultivation, exhausted first of nitrogen and afterwards of phosphoric acid; but that after this stage there is no further exhaustion of any constituent; for no plant will grow without phosphoric acid. If phosphoric acid alone is supplied as manure, potash and soda would next be exhausted; but this is not the case; phosphoric acid alone has not, to any extent at least, been applied to the lands, and, therefore, if there is a deficient yield of wheat, &c., we must attribute it to a deficiency of ammonia. If the soils that have once grown Cereal grains now refuse to do so, it may be attributed to a deficiency of phosphoric acid; let this be supplied, and a crop of wheat from fifteen to twenty bushels may be depended on. On farms which have been devoted to dairying or grazing purposes, and from which fifty to sixty pounds of phosphate of lime have been removed in every ton of cheese exported, besides that which has formed the bones of the animals kept on the farm, the exhaustion would be principally phosphoric acid; and as many of the grasses and clover collect nitrogen from the atmosphere, which would, after serving important purposes in the animal functions, be returned to the soil in the liquid and solid excrements, the farm would, relatively to other ingredients, become rich in nitrogenous matter, and the application of phosphoric acid supplying an actual deficiency, would be attended with very beneficial results. On the other hand, if the exhaustion was caused by the growth of Cereal grains, nitrogen would be totally exhausted from the soil long before the exhaustion of phosphoric acid, and it would be necessary to supply this before a large crop of wheat could be obtained, though all the mineral elements were present.

It is very evident that the great problem to be solved by chemists and experimental farmers is the discovery of a cheap means of supplying ammonia. That they will succeed in solving it, there can be no reasonable doubt. In England and Scotland the turnip is the great source of nitrogen, and its culture is very rapidly extending; one-fourth of the farm has for several years past been devoted to this crop, and now, under free-trade laws and low prices, it is found profitable to increase this proportion, and cultivate one-third, and even two-fifths, of the entire farm with turnips—and this on account of its feeding and nitrogen collecting properties. I am aware there are some objections to the extensive growth of turnips in America; the hot, dry summers and severe winters render it difficult to grow them, and troublesome to keep them when grown. And I am in hopes that ere long, when the public mind is fully awake to the great importance of this subject, some plant of equal or superior nitrogen collective powers to the turnip will be discovered, suitable to the climate and the requirements of the case.

From what has been already said, it will be understood that super-

phosphate of lime has a magical effect on the growth of the turnip, increasing the crop, in one experiment given, sixteen fold. Its effect cannot be accounted for by the supposition of an exhaustion of phosphoric acid from the soil; for, on the same kinds of soils, in Mr. Lawes's experiments, seventeen bushels of wheat per acre were successively removed for seven years, without any manure; whereas, in the turnip experiments—turnips containing much less phosphoric acid than wheat—the plot unmanured gave but a few hundred bulbs per acre the third year, and afterwards were so small as not to be considered worth weighing, presenting a truly pitiable aspect by the side of those manured with super-phosphate of lime. They threw out roots of a great length in search of food, but the bulbs were no larger than the common turnip-radishes.

TABLE VI.—TURNIP EXPERIMENTS.

Years.	Acre continuously unmanured.				With super-phosphate alone, every year.				With super-phosphate of lime and mixed alkalies.			
	Tons.	Cwt.	Qrs.	Lbs.	Tons.	Cwt.	Qrs.	Lbs.	Tons.	Cwt.	Qrs.	Lbs.
1843.....	4	3	3	2	12	3	2	8	11	17	2	0
1844.....	2	4	1	0	7	14	3	0	5	13	2	0
1845.....	0	13	2	24	12	13	3	12	12	12	2	8
1846.....	.....				1	18	0	0	3	10	1	20
1847.....	.....				5	11	0	0	5	16	0	0
1848.....	.....				10	1	0	8	9	14	2	0
1849.....	.....				3	1	0	0	3	13	2	8
1850.....	.....				11	9	0	0	9	7	1	12
Total.....	.....				65	16	1	1	62	5	1	20
Mean.....	.....				8	4	2	2	7	15	2	20

The above table shows the effect of super-phosphate of lime alone, and of super-phosphate of lime and mixed alkalies, applied each year on the turnip plant; the bulbs alone being given. The table speaks for itself, and proves the former assertion, that turnips in ordinary agriculture require no mineral manure, except phosphate of lime; and it also shows the great value of this manure for turnips, averaging, in eight successive years, $8\frac{1}{4}$ tons per acre, by its sole application on a soil not well adapted for turnip culture.

Now that large quantities of mineral phosphate of lime have lately been discovered in several places in the country, it becomes a matter of national importance as to whether this can be profitably used to increase the growth of Cereal grains or not.

Judging from the experiments of Mr. Lawes, and the practice of the best British farmers, I think that little immediate benefit will be derived from its direct application to the wheat or other Cereal crops; but if applied

to turnips, or some similar plants, which collect nitrogen from the atmosphere, it will thus, by supplying the required nitrogen, be of immense indirect value to the wheat crop. It is, therefore, a matter of experiment how far turnip culture can be profitably adopted by our farmers; and, also, whether any other plant well suited to the climate, that will collect ammonia from the atmosphere, will be greatly benefited by the super-phosphate of lime. I cannot speak from experience as to the feasibility of growing turnips on a large scale in this climate, but am assured by several eminent farmers and gardeners that no real difficulty is in the way. P. Barry, esq., of Rochester, informs me that he has seen as fine crops of turnips grown here as he ever saw in the best turnip-growing districts of England, Scotland, or Normandy—and that, too, with much less preparation than is found necessary to bestow on the turnip-fields of England.

It may not be uninteresting to say a few words on the preparation of the soil and general management of the turnip crop in the best British districts. Of an arable farm, one-fourth is wheat, one-fourth barley and oats, one-fourth clover, and one-fourth turnips and potatoes. Wheat is usually sown after clover, at one ploughing, manured with farm-yard dung and ploughed under. After the wheat is cut, the stubble is dragged with a heavy harrow or cultivator, causing all annual weeds to germinate. It is then ploughed deep and well, and left in that state until spring, when, as early as the weather will permit, it is ploughed again, and left till after barley sowing is finished. It is then dragged and cultivated, destroying roots and other weeds, which are carried off. It is then ploughed again, and the same process of dragging, rolling, &c., repeated. It is then in a fine state for sowing. The land is thrown into ridges, by means of a double mould-board plough, about two feet apart. The seed should be sown as soon as ridged, while the soil is fresh and moist. About 400 pounds of super-phosphate of lime is sown to the acre, and 1 to 2 pounds of seed. A drill is used, which deposites the manure on the ridge and the seed on the manure; a light roller following slightly covers it.

One of the striking effects of super-phosphate of lime is, that it pushes the plant rapidly forward while in its young and tender state, when it is so liable to be injured by the fly, which, before super-phosphate was used as a manure for the turnip crop, often utterly destroyed it. When in the rough leaf, the plants are singled out, by means of a common hoe, about eight inches apart. They are, about three weeks after, hoed over again, and a horse hoe is kept continually going between the rows. This keeps the land clean, and in a light pervious state, so well calculated to receive the full benefit of any ammonia in the atmosphere. The turnip crop completely (except on very heavy clays) supersedes the long or summer fallow. The great pains thus taken with the turnip, costing three times the labor of the wheat crop, are a sufficient proof of the high value placed upon it in the system of British agriculture.

The sources of phosphate of lime, and its manufacture into super-phosphate of lime, now claim our attention. In England, phosphate of lime is obtained from Saldanha Bay guano, "animal charcoal," or calcined bones, which have been used in the refining of sugar; and lastly and principally, from coprolites—a name given by Dr. Buckland to the fossilized excrements of the antediluvian animals. Professor Henslow,

who discovered these rounded water-worn nodules in the crag formation, thought, from their peculiar form, and the frequency of sharks' teeth and other organic remains found in them, that they were the dung of a former generation of animals. He therefore called them coprolites, and, though this opinion is now admitted erroneous, yet they still retain the name.

The upper and lower green sand formation also contain nodules of phosphate of lime, which have not been used to any great extent, owing to the superior facilities of working the beds of the crag in Suffolk and Essex, where they are found in unlimited quantities. The mean composition of the Suffolk coprolites, from several analyses made in the Rothamsted laboratory, may be estimated at—

Bone phosphate of lime, with a little phosphate of iron	55
Carbonate of lime	25
Matter insoluble in H C l	20
	100

There is a mineral phosphate of lime, apatite, which has been known to exist in Estremadura, in Spain, for a long period. Dr. Daubeny and Captain Willington visited the locality a few years since, for the purpose of ascertaining whether it existed in sufficient quantities for agricultural purposes. They describe it as a vein many feet thick, extending over miles of country, but situated in a locality where it will have to be transported for a long distance upon the backs of mules. Some tons of this apatite were imported into England, but the price was necessarily much too high for commercial purposes.

It is a hard crystallized rock, of a yellowish-white or greenish color, and composed, according to Dr. Daubeny, of—

Silica	1.70
Peroxide of iron	3.15
Fluoride of calcium	14.00
Phosphate of lime	81.15
	100.00

Professor Way, in a small portion of this mineral, found 85½ per cent. of phosphate of lime. It resembles in many respects the phosphate of lime found at Crown Point, of which we shall speak further on. It contains no carbonate of lime; but the 14 per cent. of fluoride of calcium is a great objection, as by it the effective strength of the sulphuric acid is considerably reduced, 100 pounds fluoride of lime requiring 103 pounds real sulphuric acid to convert it into sulphate of lime. The escape, too, of the fluorine gas in such large quantities is very obnoxious, and renders the manufacture of apatite into super-phosphate of lime not only disagreeable, but difficult.

The process of manufacturing super-phosphate of lime in the principal factory in England is as follows: The stones (for such the coprolites are to all appearance) are first reduced to a powder about the fineness of corn-meal. This is accomplished by passing them through two cast-

iron rollers about eighteen inches in diameter. The first rollers are placed above the second pair, which are set close together, reducing the stones to about the size of peas. They are then passed through millstones similar to those used to grind wheat, but driven with greater speed. The powder is then placed in a large iron vessel lined with lead, having within it a number of paddles revolving with great rapidity; water sufficient is added to convert it into a thick cream; sulphuric acid is now added, and the mixture agitated with the paddles, similarly to the process of churning, for about five minutes. The semi fluid mass is then thrown out and placed in a heap; and such is the heat generated by the process, that in a few days it will become solid, and may be placed in bags. In this factory fifteen hundred tons are usually placed in a heap, which will remain hot for months; the heat materially aiding the decomposition of the phosphates. Bones alone do not make a solid manure when mixed with sulphuric acid; but if a portion of the mineral phosphate of lime is used with them, they form a very valuable and efficacious manure, which can be transported in bags and sown without admixture with ashes.

As before stated, the Spanish phosphate of lime (apatite) is too expensive to use for agricultural purposes. Yet Mr. Lawes obtained a quantity and made a few experiments with it; which, as this substance closely resembles the American phosphate of lime, it may be interesting to give

TURNIP EXPERIMENTS.

Description of manure used per acre.

	Turnip bulbs.	
	Tons.	Cwt.
No manure	2	4¼
Three cwt. finely-ground apatite	3	1
Two hundred pounds apatite, decomposed with sulphuric acid	6	15¾
Five cwt. super-phosphate of lime manufactured from calcined bones	7	14¾

It is seen that three hundred and thirty-six pounds of undecomposed apatite, though reduced to the finest powder, gave an increase of only sixteen and three-quarters cwt. of turnip bulbs per acre; while two hundred pounds manufactured into super-phosphate of lime gave an increase over the unmanured acre of four tons and eleven and a half cwt., and more than double that of the undecomposed apatite. The acre dressed with super-phosphate of lime from calcined bones gives a slight increase over the decomposed apatite, but not in a corresponding ratio with the increased quantity applied.

From this we may conclude that mineral phosphate of lime, provided it contain the same amount of phosphoric acid and no deleterious substances, is just as good as that obtained from bones when both are made into super-phosphate of lime. If both are applied in their undecomposed state, the calcined bones appear to be slightly soluble, and to have a better effect than the ground apatite. The value of phosphate of lime in England in such substances as apatite, coprolites, &c., is twenty-four cents per ton for every one cent of bone-earth phosphate which they contain. Thus, if a substance contains eighty per cent. phosphate of

lime, it will be worth $19 20 per ton; if ninety, it will be worth $21 60 per ton in any British port in its natural state. If, however, it contains but a small per-centage of phosphate of lime, and considerable carbonate or fluoride of lime, its value, calculated on the per-centage of phosphate of lime, will be considerably reduced, inasmuch as the substances have to be neutralized before the sulphuric acid will act upon the lime. The price of boiled bones is $21 per ton; or, calculating them to contain sixty per cent. of phosphate of lime, $7 per ton higher than they would be worth according to the above method of valuation; but it must be remembered they contain some organic matter which, especially the nitrogen, is very valuable. The wholesale price of super-phosphate of lime in London, manufactured from the Suffolk coprolites which have been described, is $20 per ton; that manufactured from calcined bones, Saldanha Bay guano, &c., is worth $33 per ton.

We must now consider, as being more interesting to our farmers, the value of the recent discovery of unlimited, almost pure, phosphate of ime in the United States, especially that of Crown Point, Essex county, New York, and that of the New Jersey Zinc Company. The former, we believe, was discovered by Professor Emmons, of Albany, and is supposed to be the richest vein of phosphate of lime in the world. Some selected specimens have been found to contain ninety per cent. of bone-earth phosphate. Several barrels have been sent to England for trial, where, provided it can be furnished cheap enough, it will be largely used. The samples sent there do not appear to have been well selected, and contained considerable quartz; which, as the facilities for working the mine increase, will be avoided. A large lump of it was broken up, and a fair specimen taken for analysis by Professor Way, with the following result:

Composition of the American Phosphate of Lime.

Bituminous matter and water expelled at red-heat	0.69
Substances insoluble in acid, chiefly quartz sand	16.79
Silica (soluble in acids)	9.65
Phosphoric acid, equal to 62.27 bone-earth phosphate	30.20
Lime	40.10
Peroxide of iron	6.47
Magnesia	1.08
Chloride of sodium	0.08
Soda	0.20
Potash	0.25
Sulphuric acid	trace.
Fluorine and loss in analysis	3.49
	100.00

This is a much superior article to the Suffolk coprolites, though I believe the above is not so good as the average of that obtained from the same source. It is not so hard, and requires but little labor to pulverize it; and hence it will be manufactured into super-phosphate of lime at a much less cost of labor and machinery than the coprolites now used in England. The absence, too, of carbonate of lime, of which twenty-five

per cent. is found in the coprolites, is a very great advantage, requiring a much less quantity of sulphuric acid for its manufacture into super-phosphate of lime.

It would be useless to give the amount of sulphuric acid needed for the conversion of this article into super-phosphate of lime, deduced from the above analysis; for, though there can be no doubt that the figures represent the true composition of the sample analyzed, yet they considerably underrate the amount of phosphate of lime which a well selected quantity would contain; and it will be easy for any one to calculate the quantity of acid best to use (the amount of phosphate of lime and lime being known) from the date before given. But it must be borne in mind that, when speaking of sulphuric acid, I have referred to the pure anhydrous acid, and not to oil of vitriol, or the commercial sulphuric or brown acid. At the end of this paper will be found a table of Dr. Acre's, showing the amount of real sulphuric acid contained in oil of vitriol of various densities. The "chamber," or "brown acid," of the manufactures of Sp. Gr. 1.7 is the cheapest and most generally used article for the manfacture of super-phosphate of lime; one hundred pounds of this acid contain sixty-five pounds of real sulphuric acid; its wholesale price in London is eleven mills per pound; there being but little demand for this article at present; the price is much higher; but as the demand increases it will doubtless be manufactured on a large scale, at a much less cost; it is now sold by the car boy, in the principal cities, at $2\frac{1}{2}$ to 3 cents per pound; it is not so dangerous to use as most people imagine, and, if ordinary care is exercised, nothing need happen worse than an occasional blotch of the clothes and a stain on the boots, &c.

It is not probable that the mineral phosphate will be manufactured by the farmers themselves; so that I need not dwell on it any longer. But bones are of great importance, and at the command, to some extent, of every farmer, who would find it much to his interest to convert them into manure for his soil, rather than let them lie bleaching in the sun in some out-of-the-way place, shedding their odor on the desert air. Bones, if finely ground, will do good if applied in their natural state; but their benefit is small and slow; and it is best to decompose them with sulphuric acid, especially as a manure for turnips, rutabagas, young trees, cabbage, beets, &c. To use acid economically the bones should always be finely ground; one hundred pounds of fresh bones contain—

Phosphate of lime	45
Carbonate of lime	4.0

Now, to convert these forty-five pounds phosphate into bi-phosphate of lime, it will be found from data previously given (page 308) that we have got to abstract $14\frac{1}{2}$ pounds of lime by sulphuric acid, converting it into sulphate of lime. To do this, twenty pounds of real sulphuric acid would be required, or $31\frac{3}{4}$ pounds of brown or chamber acid, (Sp. Gr. 1.7;) but before the acid will act on the phosphate the carbonate of lime must be converted into a sulphate; to do this $3\frac{1}{4}$ pounds real acid will be neutralized, or five pounds of the brown acid, (Sp. Gr. 1.7.) We have, therefore, in the manufacture of super-phosphate of lime from bones, to put about twenty-four pounds of real sulphuric acid, or thirty-seven pounds of brown acid, (Sp. Gr. 1.7,) to one hundred pounds of the bone dust.

A good method for the farmer to make his own super-phosphate of lime, is to get a large tub, or end of a cask, place in it the quantity of bone dust that can be best worked at a time—say 60 pounds; sufficient water should then be added just to wet all the bones; let this be stirred till the dust is all wet, and then add the proper quantity of acid, 22 pounds, (Sp. Gr. 1.7.) When mixed, it can be thrown into a heap on the floor, and the process repeated. The operation should be done expeditiously, and the larger the heap the better, as the heat engendered during the process materially assists the acid in decomposing the phosphate.

Some farmers think the above method too tedious, and prefer placing the whole amount of dust in a large heap on a wooden floor; wet it with water and apply the acid in small quantities, repeatedly turning the heap and applying the acid till the proper quantity is used. This plan does not require so much labor, but the farmer insures a more equally mixed and better manufactured article. When properly manufactured it will be sufficiently dry to sow by hand without any absorbent substance; but if drilled, as it always should be when used as a manure for turnips, it is necessary to mix with it some dry materials—such as coal ashes, dry, leached ashes, saw-dust, peat, &c.; *but on no consideration let lime, wood-ashes, or any other caustic alkalies or alkaline earth be used*, for a reaction immediately takes place, and the bi-phosphate is converted back again into the bone-earth phosphate of lime, and all the labor has been in vain.

Super phosphate of lime, manufactured from fresh bones, is doubtless much the best article, if employed as a manure for wheat, corn, Timothy, &c., as, besides the phosphoric acid, it contains considerable nitrogen. Fresh bones contain 5 per cent. of nitrogen, which, at the present value of ammonia, in guano or sulphate of ammonia, would make bones worth, for this element alone, 50 cents per 100 pounds; and, according to the estimate of Mr. Lawes—that 5 pounds of ammonia will produce an extra bushel of wheat—we might expect a little more than a bushel by the application of 100 pounds of fresh bones. The super-phosphate manufactured from the apatite, or, as Professor Emmons named it, the eupyrchroite, would be a purely mineral manure, and would have no beneficial effect on wheat, unless the soil was agriculturally deficient of phosphoric acid, and in that case it would only raise the produce to the natural or normal produce of the soil—say 15 to 20 bushels of grain.

In relation to the discovery of the mineral phosphate in this country, Professor Johnston has said, "American farmers, in general, have not *the knowledge to appreciate the value of such a manuring substance as this, nor the ability to purchase it*, when manufactured into super-phosphate of lime; the discovery, therefore, will be a boon for the present to both countries. It will make more abundant and cheap the means of fertility, which our soils require, while, by supplying a new article of traffic, only salable in Great Britain, it will form a new bond of connexion between our kindred nations."

The English farmers are most loudly and justly complaining of high rents, high taxes, and *low prices in consequence of free trade;* and it is American competition that they must fear. They think that, with a good climate, admirable means of transportation, both natural and artificial, a rich, new soil, which can be had comparatively for nothing, the American farmers will inundate their market with cheap wheat, corn, beef,

pork, butter, and cheese, and thus ruin them. Now, Professor Johnston, with the feelings of a philanthropist, wished to cheer the half-broken-hearted farmer in this his hour of need; and to do it, he has, unfortunately for the poor farmers, *deceived them*. He has represented this country as scarcely able to raise wheat sufficient for its own population, and that, while this population is increasing at an extraordinary rapidity, the wheat soils are gradually losing their fertility, and that farmers in the rich Genesee country are laying their land down to grass, finding it unprofitable to grow wheat at present prices.

The motive of the Professor is at once apparent, and all intelligent British farmers readily perceive it. This laudable motive induced him to assert that the discovery of large quantities of rich phosphate of lime would be of no benefit but to the British agriculturist; that the American farmer had neither the knowledge to appreciate, nor the money to purchase, such an article, &c. A careful reader would be led to conclude that Professor Johnston was mistaken; for he himself says that he found the American farmers very intelligent, and generally well acquainted with the geological formation of their soils, and the influence it had on their adaptation to certain crops, and, also, that they were earnestly seeking all the information that was to be obtained from science; that his lectures were listened to with great attention, and that the State of New York had ordered several thousand copies to be printed for gratuitous distribution. Does this show an indifference to agricultural science? Undoubtedly not. If the learned Professor taught any system of agriculture that could be profitably adopted by American farmers, their love of money, if nothing else, would insure its universal and instantaneous adoption. "It will pay them to use super-phosphate of lime as a manure for American soils, if American farmers have intelligence enough to sow it." If Professor Johnston really believed what he wrote, the American farmers, I venture to predict, will speedily undeceive him. It will be found that, while it is a valuable export, and a commodity which British soils require, it will soon be considered not only useful, but indispensable to American agriculture. Unfortunately for the British tenant farmer, overburdened, as he is, with rent, taxes, hedge-row timber, and game, which he must keep, but not eat, America will continue to keep down the English market at that price which the British farmer will find hard to sell at and pay a high rent.

If it will pay the British farmer to use the super-phosphate, why will it not pay the American? Hitherto the prices of grain and provisions have been much higher there than here; but now prices are nearly as high for wheat and meat in New as in Old England; while potatoes, and all kinds of roots, are double the price here that they are there. The answer to this inquiry brings us back to the former position, that root crops must be extensively cultivated. That it will be profitable to do so, there is no doubt. I have myself had fears that this climate was not favorable to their growth, but facts do not sustain them; and it is now pretty well established that great crops of rutabaga, or, as they are called in England, the Swedish turnip, can be easily raised in this county. In fact, some of the crops to which agricultural societies have awarded premiums this last fall were, according to the published statements, much heavier than any crop I ever saw grown in the best British turnip districts, under the most favorable condition of soil and manuring. Let

it be clearly understood that the great requirement of the wheat, barley, oat, Indian corn, and Timothy crops, is nitrogen, in an available form, *in the soil;* that rutabaga and other varieties of turnips will collect this nitrogen, in the form of ammonia and nitric acid, from the atmosphere; and that, when they are consumed by cattle and sheep, nearly all this nitrogen is returned to the soil, in an available form, for the ensuing wheat crops; and that these turnip crops are greatly, almost incredibly, benefited by the application of super-phosphate of lime, and farmers will begin to cultivate the turnip to a considerable extent, and a new era will commence in American agriculture.

I believe it will not pay to purchase guano, as a manure for wheat, at present prices; but it certainly will pay to use super-phosphate of lime on the turnip crop, and thus obtain the essentially important element of guano, ammonia, from the great storehouse into which the carbonate of ammonia, arising from the decomposition of animals and vegetables, is continually escaping and is brought back to the plants by every shower of rain.

A good crop of rutabagas, of 20 tons of bulbs and 8 tons of leaves, contains the following substances:

	Weight in pounds.	Water.	Dry matter.	Ash.	Nitrogen.	Phosphoric acid.	Potash.	Soda.	Chloride of sodium.	Sulphuric acid.	Lime.
Bulbs	40,000	36,000	4,000	280	80	22	123	5	19	28	86
Leaf	16,000	14,080	1,920	230	57	11	50	1½	13	27	26
Total...	56,000	50,080	5,920	510	137	33	173	6½	32	55	112

The consumption on the soil of such a crop of turnips would raise a crop of wheat of from 15 to 40 bushels per acre, calculating that 5 pounds of ammonia will produce an extra bushel of grain; and this result is obtained by growing turnips over and above their great value as a food for cattle.

Another valuable means of obtaining nitrogen from the atmosphere is by growing red clover. A crop that would make two tons of clover hay would contain 80 pounds of nitrogen, without reckoning that contained in the roots of the plants. Such a crop of clover ploughed under or consumed by stock, and all the manure carefully saved and applied to the soil, would increase the following wheat crop 16 bushels per acre. In England it is found unadvisable to grow red clover oftener than once in eight years, as if sown oftener the land gets "clover sick," and the crop is a complete failure. The soil of this country, especially of Western New York, is exceedingly well adapted for clover, and I have seen much larger crops here than are ever obtained in England by the use of the richest artificial means.

Super-phosphate of lime will be found a good manure for clover, especially on soils that are benefited by the application of plaster on the clover crop. Peas and vetches also collect their nitrogen from the atmosphere, of which they contain a large amount. For these crops super-

phosphate of lime is of no benefit. For beans, super phosphate of lime, in connexion with a salt of potash, will be found a good manure. For mangel-wurzel, beets, carrots, and parsnips, super phosphate of lime is a good auxiliary, and will, if applied in conjunction with barn-yard manure, yield immense crops.

For tobacco I believe super-phosphate of lime will be found very beneficial. The seed is first sown in beds, and the plants transplanted, when about four inches high, into the field. During the first stages of the growth, the plants are liable to be destroyed by insects; and hence any manure that would force them along rapidly out of their reach, would be valuable; this I think super-phosphate of lime will do. Then, again, the object of the grower is not to obtain a very large coarse crop, but a small one, perfectly elaborated, with a small per-centage of ash. From the effect of super-phosphate of lime on the chemical composition of the turnip, favoring, as it is known to do, great rapidity of growth and an early maturity, yielding a crop with a large amount of dry *organic* matter fully elaborated, I think this manure will be, of all others, the best to use for the tobacco plant. I have said that if in English farming the turnip crop was suplied with super-phosphate of lime, it would find sufficient alkalies and minerals in the soils; but I must not be understood to assert that if this manure is applied to the tobacco or cotton-plant, it will be unnecessary to apply any other minerals or alkalies. The case is a very different one in England; the turnips, which it will be seen contain a very large portion of potash, *are always consumed on the farm*, and thus the potash and other minerals are returned to the soil in the excrements of the animals consuming them. But tobacco is all exported from the plantation and consumed by a class of animals which return nothing to the soil; and as it contains a large amount of mineral matter, it is but reasonable to suppose that the soil will soon be exhausted of minerals if none are supplied as a manure. Of the cheapest method of supplying the deficiency, I cannot speak, but merely wish to call attention to the use of super-phosphate of lime, as a means of producing great rapidity of growth during the first stages of the plant and inducing early maturity. The super-phosphate of lime, at the rate of 5 or 6 cwt. per acre, should be sown on the beds as contiguous to the seeds as possible; and when the plants are transplanted, a small quantity—say a teaspoonful—should be placed immediately below the plant in the hill; the deliquiescent nature of the super-phosphate attracts considerable moisture, and the plants will not be so liable to suffer from drought.

For potatoes this manure cannot be recommended. The application of artificial manures to various agricultural crops is a subject of great interest and importance. But it is one in which the farmer needs to exercise caution, as it is very easy to lose much money, even though their effect is beneficial. It is necessary to know what increase a given amount of manure of a certain price will produce; and the value of the produce being known, the farmer can calculate with certainty. For instance: I have detailed experiments in which sulphate and muriate of ammonia were used with a very beneficial effect on the wheat crop; yet sulphate and muriate of ammonia, at the present cost of these manures, and the price of wheat, cannot be employed without serious loss. If they should ever be sold at half their present price, or should wheat rise to double its present value, these manures might be used at a great

profit; so it is with guano, lime, plaster, super-phosphate of lime, or any other artificial manure. Their application may be very beneficial in a *scientific sense;* whether it would be so in an agricultural or economical one, depends on their cost, their effect, and the price of the produce.

At present we have but little data on which to make satisfactory calculations, and they can only be obtained by extensive systematic field experiments, conducted by scientific and practical men. Agricultural papers for the last few years, in America and Europe, have been filled with experiments with artificial manures, but, from want of a knowledge of their composition, the previous treatment of the soil, and other incidental circumstances, little positive knowledge can be obtained from them; and, though the experimenters are worthy of all credit, yet, had the money which these individual experiments cost been devoted to one experimental farm, whose experiments could be systematically carried out, the state of our agriculture would be very far advanced to what it is at present, and agricultural operations could be carried on with all the certainty that attends manufacturing processes. It has been supposed that a knowledge of the composition of plants, especially of their ashes, would enable the scientific agriculturist to apply the proper kind of manure, and that the crop would increase or diminish in exact proportion as these ash constituents were supplied or withheld. But this theory, however plausible it may appear, and though it has received the sanction of the highest scientific authorities, yet common experience, the infallible test in all the great practical arts, has pronounced this view erroneous. [?] Many readers of this essay who may have adopted these theories, will be surprised to see super-phosphate of lime recommended for root crops which contain so little phosphoric acid, and so much stress laid on the importance of ammonia for wheat, which is emphatically a carbonaceous grain, as also condemning it as a manure for beans and peas, which are eminently *nitrogenous.* All that can be said is that, however paradoxical they may appear, they are the conclusions of those who have spent years in a most laborious and expensive investigation of the requirements of agricultural plants, both in the field and the laboratory. They are also substantiated by the general practice of the best practical farmers.

Many agricultural writers in this country and in England have shown a warmth of feeling on this subject that is perfectly irreconcilable with a love of truth and the advancement of scientific agriculture. They seem to think that individuals had no right to make experiments, however carefully conducted, and certainly no right to publish their results when obtained, especially as they happened to run counter to these gentlemen's theories. All I have to say on the subject is, that experience will very soon decide which of the two systems is right; and, as a believer in the French, rather than in the German theory of artificial manures, I have no fears for the result.

It would have been satisfactory to have given some experiments with the mineral phosphate of lime, in its natural and manufactured state, made in this country; but, though it has been used by a great many different individuals, there are scarcely any experiments published which are at all conclusive on the subject.

B. P. Johnson, esq., has kindly furnished me with the following: Mr. B. B. Kirtland, of Cantonment farm, Greenbush, used the Crown

Point mineral, manufactured into super-phosphate of lime, on Indian corn, at the rate of a table-spoonful to the hill; and, by way of comparison, on alternate rows plaster and ashes were sown; and on another portion fish manure was used. The result was, the rows which received the phosphate were the most vigorous, stood the drought much the best, and at harvest had the most good corn. He tried it on cabbages, cauliflowers, and melons, with the most marked result; applied it on grass, but with no perceptible effect. But it is proper, also, to mention that plaster and ashes applied at the same time, on another portion of the field, gave no visible results.

Professor Emmons has used it on Indian corn, melons, tomatoes, &c., with like effect. I have, myself, never seen it applied to Indian corn, but, judging from the effect it has on wheat, should think it is not to be expected to do much good, except on soils rich in nitrogenous matter and deficient in mineral substances—a condition in which soils that have long been cultivated with Cereal crops are hardly ever found.

But I shall be happy to alter my opinion if *experiments,* which I trust will be extensively made this summer, shall prove the contrary. In applying super-phosphate of lime, as a general rule, it is advisable to place it as near the seed as possible, as it does not injure the seed if mixed with it, and the rootlets of the young plant immediately find a palatable nourishment.

I cannot but look on the discovery of this rich phosphate of lime, and its value as a manure for our crops, as a subject of national importance, which will have a great influence in modifying some of the reprehensible features of our present system of culture, and establishing one in which the now immense export of the valuable fertilizers of the soil shall be reduced to that quantity which the different soils will bear, and retain their fertility.

DETAILS OF AN EXPERIMENT ON RAISING POTATOES, IN THE YEAR 1852.

By H. H. Eastman, of Marshall, Oneida county, N. Y.

[We give the very interesting and valuable experiments made by H. H. Eastman, of Marshall, Oneida county, New York, which have been undertaken in consequence of the premiums offered by the society. Mr. Eastman will continue his experiments next season, and we anticipate important results from the experiments which shall be made.]

The various experiments.	Different rows in each experiment, relatively.	Weight of seed.	Condition of seed when used.	With and without manure, and how applied.	Quantity of manure used.	Weight of produce.	Bushels p'r acre.	Remarks.
		Lbs. oz.				Lbs. oz.		
Different manure in the hill, and no manure.	No manure	6 0	Whole potato	No manure		61 12	166	Smooth, and good sizes.
	Hog manure	6 0	do	In the hill	Half-shovelful in each hill.	100 12	271	Some rough spots; good.
	Equal quantities of hog manure, ashes, lime, and gypsum.	6 0	do	do	Handful in each hill.	60 12	163	Smooth, and good sizes.
	Long, unfermented manure.	6 0	do	do	Two-thirds shovelful in each hill.	75 12	203	Quite rough; good sizes.
	Compost	6 0	do	do	Two-thirds shovelful in each hill.	77 12	209	Smooth; good sizes.
Fermented or rotted manure.	In the hill	6 0	One whole potato in hill.	do	Two-thirds shovelful.	78 12	211	Some rough spots.
	On the top of hill when planted.	6 0	One whole potato in hill.	Top of hill	Two-thirds shovelful.	68 0	183	Smooth.
Manure of fowls	In hill	6 0	One whole potato in hill.	In hill	Large handful to each hill.	85 4	229	Uniform in size, large, and fine.
	Top of hill at planting.	6 0	One whole potato in hill.	Top of hill	Large handful to each hill.	64 12	174	Small, and poor quality.
Ashes in hill and top of hill, after potatoes were up.	In hill	6 0	One whole potato	In hill	Handful to each hill.	59 3	159	
	Top of hill	6 0	do	Top of hill when up.	Handful to each hill.	54 3	146	

Lime in hill and top of hill, after potatoes were up.	In hill			do	In hill	Half-handful to each hill.	52	8	141	
	Top of hill	6	0	do	Top of hill when up.	Half-handful to each hill.	63	8	144	
Gypsum in hill and top of hill, after potatoes were up.	In hill	6	0	One whole in hill	In hill	Tablespoonful in each hill.	60	8	162	
	After up	6	0	do	Top of hill when up.	Tablespoonful in each hill.	58	0	156	
Early, medium, and late planting; soil very loam.	Planted 18th May	6	0	One whole potato in each hill.	No manure		53	0	142	Large, uniform in size, and good.
	Planted 23d May	6	0	One whole potato in each hill.	do		49	0	131	Smaller, uniform, and fair.
	Planted 8th June	6	0	One whole potato in each hill.	do		37	8	100	Quite small and unmarketable; unfit for the table.
Large, medium, and small potatoes for seed.	Large	12	4	One whole in hill	do		80	0	215	Large, uniform in size; good quality.
	Medium	6	0	do	do		50	8	135	Smaller, uniform in size, and good.
	Small	3	7	do	do		43	8	117	Very small, inferior, and unmarketable.
	Small	6	14	Two whole in hill	do		51	0	138	Very small and unmarketable.
	Small	9	0	Four whole in hill	do		63	0	167	Very small and unmarketable.
	Large	10	6	One whole in each hill.	do		71	8	192	Large, uniform in size; good.
Large potatoes cut and uncut, for seed.	Large, halved	10	6	Two halves in each hill.	do		81	0	217	Little smaller, but good and marketable.
	Large, halved	5	3	One half in each hill.	do		52	0	139	Good size, good quality, and marketable.
	Large, quartered	9	0	Four quarters in each hill.	do		58	0	156	Smaller and much inferior.
Sulphur and no sulphur.	Sulphur after potatoes were up.	6	0	One in each hill	After up	Teaspoonful to each hill.	44	0	116	Poor quality.
	No sulphur	6	0	do			52	3	140	Fair quality.
Saltpetre and no saltpetre.	Saltpetre after potatoes were up.	6	0	One whole in each hill.	After up	Teaspoonful to each hill.	52	0	139	Fair quality.
	No saltpetre	6	0	One whole in each hill.			53	8	143	Fair quality.

DETAILS OF AN EXPERIMENT ON RAISING POTATOES IN THE YEAR 1852—Continued.

The various experiments.	Different rows in each experiment, relatively.	Weight of seed.	Condition of seed when used.	With and without manure, and how applied.	Quantity of manure used.	Weight of produce.	Bushels per acre.	Remarks.
		Lbs. oz.				*Lbs. oz.*		
Gypsum.....	Top of the hill after up.	6 0	One whole potato in each hill.	Top of hill after potatoes are up.	One tablespoonful to each hill.	58 0	156	Uniform in size, and good quality.
	No gypsum.....	6 0	One whole potato in each hill.	.....	.....	48 0	130	Smaller in size, and quality not so good
Early, medium, and late planting; soil mucky.	Planted 18th May..	6 0	Whole potato in each hill.	.....	.....	74 0	201	Large, and good quality.
	Planted 28th May.	6 0	Whole potato in each hill.	.....	.....	67 0	182	Smaller, and poor quality.
	Planted 10th June..	6 0	Whole potato in each hill.	.....	.....	56 0	147	Small and unmarketable.
Compost and fresh or unfermented manure in the hill, and spread broadcast upon the surface.	Compost in the hill; 5 rows, 5 hills in the row, three feet apart, forming a square.		One whole potato in each hill.	Compost or rotten manure in the hill.	Two-thirds shovelful in each hill.	73 0	200	Potatoes good size; exterior rough and worm-eaten.
	Compost spread broadcast on the surface; 5 rows, 5 hills in the row, square.	6 0	One whole potato in each hill.	Compost or rotten manure, spread broadcast on the surface.	An equal quantity with that in the hill.	59 12	159	Good size, smooth, and good quality.
	Long or unfermented manure in hill; 5 rows, 5 hills in the row, forming a square.	6 0	One whole potato in each hill.	Unfermented manure in hill.	Two-thirds shovelful in each hill.	83 8	224	Good, fair size, rough exterior, and some worm-eaten.
	Long or unfermented manure spread broadcast on the surface; 5 rows, 5 hills in each row, forming a square.	6 0	One whole potato in each hill.	Unfermented manure, spread broadcast upon the surface.	An equal quantity with that in the hill.	91 4	245	Large, fine, uniform in size, and good quality.

The ground upon which the foregoing experiment was tried was green-sward ploughed early in the spring, nine inches deep; soil gravelly loam, except as otherwise stated. Planted 18th of May, except as otherwise stated. Hoed twice—first, 18th of June; second, about two weeks after. The cultivation was intended to be as nearly alike as possible. Taken from the ground as soon as the vines were dead, which was not till killed by frost. All the rows, except as otherwise stated, consisted of thirty hills each, three feet apart each way. All the potatoes were free from the rot. The kind of potato planted was the red variety, which here goes by the name of "Irish Lunkers."—*Journal of the New York State Agricultural Society.*

VIII.

COMMERCIAL AND OTHER STATISTICS.

STATE DEBTS AND RESOURCES.

States.	Absolute debt.	Contingent debt.	Total debt.	Annual interest on absolute debt.	Amount of school fund.	Other productive property.	Other property not now productive.	Ordinary annual expenditure exclusive of debts and schools.
Maine	$600,000	.....	$600,000	$36,000	$350,000	$700,000	.....	$159,000
New Hampshire	76,000	.....	75,000	4,000	.....	.....	.....	80,000
Vermont	.....	.....	.....	.....	.....	.....	.....	100,000
Massachusetts	1,341,000	$5,049,000	6,391,000	63,000	955,000	7,821,000	$1,607,000	500,000
Rhode Island	.....	382,000	382,000	.....	56,000	.....	.....	50,000
Connecticut	33,000	58,000	91,000	1,000	2,045,000	406,000	.....	115,000
New York	21,690,000	933,000	22,623,000	1,230,000	6,612,000	35,115,000	.....	750,000
New Jersey	71,000	.....	71,000	4,000	373,000	279,000	764,000	90,000
Pennsylvania	40,114,000	.....	40,114,000	2,014,000	.....	31,639,000	321,000	350,000
Delaware	.....	.....	.....	.....	225,000	190,000	.....	11,000
Maryland	10,796,000	4,463,000	15,260,000	650,000	148,000	11,212,000	16,319,000	170,000
Virginia	13,654,000	3,901,000	17,575,000	812,000	1,132,000	7,060,000	6,052,000	600,000
North Carolina	.....	977,000	977,000	.....	.....	.....	.....	75,000
South Carolina	2,093,000	1,051,000	3,144,000	110,000	.....	5,000,000	.....	115,000
Georgia	1,828,000	.....	1,828,000	110,000	262,000	10,000	15,000	131,000
Florida	.....	.....	.....	.....	.....	.....	.....	45,000
Alabama	5,564,000	1,087,000	6,742,000	418,000	1,075,000	700,000	.....	100,000
Mississippi	3,400,000	8,600,000	7,271,000	136,000	.....	.....	2,000,000	130,000
Louisiana	915,000	10,577,000	11,492,000	70,000	.....	.....	2,416,000	515,000
Texas	12,436,000	.....	12,436,000	.....	.....	.....	.....	100,000
Arkansas	1,506,000	.....	1,506,000	90,000	.....	.....	.....	35,000

Tennessee	3,352,000	.....	3,352,000	189,000	1,347,000	4,837,000	1,101,000	165,000
Kentucky	5,726,000	.....	5,726,000	343,000	1,400,000	6,000,000	.....	250,000
Ohio	17,339,000	.....	17,339,000	1,024,000	1,754,000	18,000,000	.....	200,000
Michigan	2,529,000	.....	2,529,000	150,000	500,000	628,000	.....	125,000
Indiana	6,907,000	.....	6,907,000	300,000	4,644,000	.....	.....	80,000
Illinois	16,627,000	.....	16,627,000	.....	790,000	5,000,000	.....	125,000
Missouri	933,000	.....	922,000	65,000	575,000	382,000	.....	110,000
Iowa	79,000	.....	79,000	5,000	132,000	.....	.....	25,000
Wisconsin	.....	.....	.....	.....	765,000	.....	.....	20,000
California, 1852	485,000	.....	485,000	.....	.....	.....	.....	500,000
Total	169,076,000	33,481,000	202,557,000	7,796,000	25,170,000	134,982,000	30,598,000	5,812,000
Total near Jan. 1, 1851	170,535,000	31,006,000	201,541,000	7,555,000	20,456,000	134,936,000	29,855,000	5,812,000
Total near Jan., 1850	169,549,000	68,756,000	209,305,000	7,677,000	21,542,000	125,369,000	27,584,000	5,673,000
Total near Jan., 1849	170,749,000	40,502,000	211,252,000	7,884,000	21,420,000	118,508,000	28,236,000	5,258,000
Total near Jan., 1848	169,776,000	35,932,000	205,708,000	8,521,000	20,338,000	111,638,000	31,498,000	5,062,000
Total near Jan., 1847	165,129,000	51,781,000	216,911,000	9,072,000	17,631,000	108,643,000	30,660,000	5,435,000
Total near Jan., 1846	179,635,000	44,388,000	224,023,000	9,930,000	16,608,000	110,306,000	23,232,000	5,455,000

ANNUAL STATEMENT OF THE UNITED STATES MINT.

Total coinage for 1852.

GOLD.

2,053,026	double-eagles	$41,060,520 00
263,106	eagles	2,631,060 00
573,901	half-eagles	2,869,505 00
1,159,381	quarter-eagles	2,899,202 50
2,045,351	gold dollars	2,045,351 00
6,094,765	pieces	51,505,638 50

SILVER.

1,100	dollars	1,100 00
77,130	half-dollars	38,565 00
177,060	quarter-dollars	44,265 00
1,535,500	dimes	153,550 00
1,000,500	half-dimes	50,025 00
18,663,500	three-cent pieces	559,905 00
27,549,555	pieces	52,352,948 50

COPPER.

5,162,094	cents	51,620 94
32,711,649	pieces	52,404,569 44

Coinage for December, 1852.

GOLD.

265,816	double eagles	$5,316,320 00
11,245	eagles	112,550 00
22,287	half-eagles	111,435 00
38,660	quarter-eagles	96,650 00
133,850	gold dollars	133,850 00
471,858	pieces	5,770,705 00

SILVER.

4,590	half-dollars	2,295 00
16,660	quarter-dollars	4,165 00
286,500	dimes	28,650 00
241,500	half-dimes	12,075 00
3,553,900	three-cent pieces	106,617 00
4,575,008	pieces	5,924,507 00

COPPER.

886,341 cents - - - - -		$8,863 41
5,461,349 pieces - - - - -		5,933,370 41
Gold bullion deposited—		
From California - - - - -		$3,265,000 00
From other sources - - - -		65,000 00
		3,330,000 00
Silver bullion deposited - - - -		19,500 00

Gold bullion deposited.

Months.	1851.	1852.
January - - - -	$5,071,669	$4,161,688
February - - - -	3,004,970	3,010,222
March - - - -	2,880,271	3,892,156
April - - - - -	2,878,353	3,091,037
May - - - - -	3,269,491	4,335,578
June - - - - -	3,637,560	6,689,474
July - - - - -	3,127,517	4,193,880
August - - - -	4,135,312	2,671,563
September - - - -	4,046,799	4,253,687
October - - . -	4,743,584	4,140,069
November - - - -	5,492,454	7,279,941
December - - - -	5,561,425	3,330,000
	47,929,405	51,049,295

E. C. DALE, *Treasurer*.

LAKE IMPORTS FOR 1852.

[From the Buffalo Commercial Advertiser.]

The following table will show the imports at the port of Buffalo by he lake for the season of 1852, and, also, for the seasons of 1850 and 1851. It will be seen that there has been a handsome increase of most articles, some being nearly, or quite, double former seasons. The value of imports this season over last exceeds $13,000,000.

	1850.	1851.	1852.
Flour - - bbls. -	1,096,183	1,261,301	1,299,513
Pork - - - -	40,005	33,261	60,669
Beef - - - - -	81,301	70,570	76,679
Whiskey - - - -	30,713	65,232	79,306
Corn-meal - - -	9,990	2,287	5,099
Seed - - - -	11,830	11,146	31,559
Eggs - - - -	5,614	12,818	7,686
Fish - - - -	9,994	6,367	6,814
Oil - - - -	5,045	6,718	7,577
Cranberries - -	918	1,500	1,176
Wine - casks.	17,339	13,721	14,522
Wheat - bushels.	3,608,261	4,260,004	5,549,778
Corn - - - -	2,521,149	6,080,330	5,136,746
Oats - - - - -	340,462	1,149,783	2,596,231
Rye - - - - -	42	19,435	112,271
Barley - - - -	3,237	166,188	497,913
Butter - - lbs. -	5,365,708	2,354,277	3,989,917
Lard - - - -	3,936,500	4,961,210	7,164,672
Tallow - - - -	1,943,600	728,100	104,686
Bacon - - - -	7,396,604	6,541,400	8,796,590
Wool - - bales. -	51,604	61,823	45,172
Hemp - - - -	1,066	2,139	3,598
Cotton - - - -	472	310	77
Flax - - - -	112	375	789
Broom-corn - - -	7,840	5,402	5,420
Leather - - rolls. -	7,795	8,628	7,155
Hides - - No. -	73,358	50,866	95,452
Copper - - tons. -	54	655	439
Iron - - - - -	3,038	2,542	4,848
Coal - - - - -	11,436	17,281	34,665
Lead - - - pigs. -	18,102	26,983	31,916
Tobacco - hhds. -	524	1,707	6,620
Lumber - - feet. -	47,416,744	84,068,589	72,337,255
Staves - - No. -	18,652,890	10,696,006	12,998,614
Live hogs - - - -	- - -	97,697	111,223
Sheep - - - -	- - -	18,906	16,590
Cattle - - - -	- - -	8,594	15,926
Horses - - - -	- - -	2,761	1,643
Buffalo robes - bales. -	- - -	3,246	80

Imports, and value thereof.

The following table will show the quantity and value of the principal articles received by lake, at this port, during the season of 1852:

Articles.		Quantity.	Value.
Flour	barrels	1,299,513	$5,847,808
Pork		60,669	1,031,373
Beef		76,679	766,790
Whiskey		79,306	793,030
Seed		31,559	315,590
Eggs		7,686	76,860
Fish		6,814	54,412
Ashes		14,522	363,050
Cranberries		1,176	11,760
Oil		7,577	227,310
Meal		5,099	15,297
Hides		95,452	262,392
Leather	rolls	7,055	178,875
Broom-corn	bales	5,420	65,040
Copper	tons	439	21,600
Buffalo robes	bales	80	4,000
Lead	pigs	31,916	119,205
Wheat	bushels	5,549,778	4,994,800
Corn		5,136,231	3,082,047
Oats		2,596,231	1,141,341
Barley		497,913	298,747
Rye		112,271	78,589
Butter	pounds	3,989,917	718,184
Lard		7,164,672	716,467
Tallow		1,014,686	101,468
Bacon		9,796,590	881,694
Lumber	feet	72,337,255	8,680,470
Staves		12,998,614	3,899,584
Wool	bales	45,172	3,342,728
Hemp		3,598	71,960
Flax		789	11,835
Cattle		15,926	796,300
Sheep		16,590	41,375
Horses		1,643	164,300
Live hogs		111,223	1,112,230
Dressed hogs		17,074	280,930
Pelts	bales	6,213	135,325
Furs		1,535	231,785
Cotton	tons	77	2,210
Coal		34,665	138,666
Iron		4,848	165,130

Imports, and value thereof— Continued.

Articles.	Quantity.	Value.
Tobacco - - hogsheads	6,620	$464,060
Tobacco - - - boxes	7,725	193,875
Sundries - - - - - - -		3,000,000
Total value - - - - - -		45,265,922
Total value, 1851 - - - - -		31,889,951
Increase - - - - - -		13,375,971

LEHIGH COAL TRADE FOR 1852.

The supply of coal sent to market by the Lehigh region was derived from the following sources:

	Tons.	Cwt.
Lehigh Coal & Navigation Company - - - - -	429,786	06
Room Run Mines - - - - - - - -	80,481	05
Beaver Meadow - - - - - - - -	46,280	06
Spring Mountain Coal - - - - - - - -	139,627	02
Colerain Coal - - - - - - - -	37,781	07
East Sugar Loaf Company - - - - - -	12,566	03
Cranberry Coal Company - - - - - -	48,920	03
Hazelton Coal Company - - - - - -	130,627	11
Diamond Coal Company - - - - - -	41,763	08
Buck Mountain Coal - - - - - -	104,202	02
Wilkesbarre Coal Company - - - - - -	41,989	19
Total - - - - - - - - - -	1,114,025	12

TRADE OF NEW ORLEANS.

VALUE OF PRODUCE OF THE INTERIOR.

A table showing the receipts of the principal articles from the interior during the year ending August 31, 1852, with their estimated average and total value.

Articles.	Amount.	Average.	Value.
Apples.....barrels..	20,356	$3 00	$61,068
Bacon, assorted.....hhds. and casks.	46,734	75 00	3,505,050
Bacon, assorted.....boxes..	3,626	35 00	126,910
Bacon, hams.....hhds. and tierces.	38,488	70 00	2,694,160
Bacon, in bulk.....pounds..	281,280	8	22,502
Bagging.....pieces..	60,044	13 00	780,572
Bale rope.....coils..	90,272	7 50	677,040
Beans.....barrels..	6,598	10 00	65,980
Butter.....kegs and firkins.	44,786	8 00	358,288
Butter.....barrels..	1,778	30 00	53,340
Beeswax.....barrels..	171	45 00	7,695
Beef.....barrels..	41,227	12 00	494,724
Beef.....tierces..	11,523	15 00	172,845
Beef, dried.....pounds..	26,100	8	2,088
Buffalo robes.....packs..	1,300	75 00	97,500
Cotton.....bales..	1,429,183	34 00	48,592,222
Corn meal.....barrels..	2,514	3 00	7,542
Corn, in ear.....barrels..	163,008	70 00	114,105
Corn, shelled.....sacks..	1,397,132	1 20	1,676,558
Cheese.....boxes..	72,441	3 50	253,543
Candles.....boxes..	53,936	6 00	323,616
Cider.....barrels..	300	3 00	900
Coal, western.....barrels..	850,000	50 00	425,000
Dried apples and peaches.....	804	5 00	4,020
Feathers.....bags..	2,065	35 00	72,275
Flaxseed.....tierces..	519	10 00	5,190
Flour.....barrels..	927,212	4 00	3,708,848
Furs.....hhds., bundles, and boxes.	2,136	.....	1,000,000
Hemp.....bales..	17,149	15 00	257,235
Hides.....	123,687	2 00	247,374
Hay.....bales..	53,434	3 00	160,302
Iron, pig.....tons..	62	30 00	1,860
Lard.....barrels and tierces.	125,496	25 00	3,137,400
Lard.....kegs..	157,689	5 00	788,445
Leather.....bundles..	7,572	25 00	189,300
Lime, western.....barrels..	42,305	1 25	52,881
Lead.....pigs..	267,564	3 20	856,204
Lead, bar.....kegs and boxes.	1,138	20 00	22,760
Lead, white.....kegs..	1,368	3 00	4,104
Molasses (estimated crop).....gallons..	18,300,000	22	4,026,000
Oats..... barrels and sacks.	463,273	75	347,454
Onions.....barrels..	17,184	2 00	34,368
Oil, linseed.....barrels..	758	26 00	19,708
Oil, castor.....barrels..	4,291	28 00	120,148
Oil, lard.....barrels..	14,114	28 00	395,192
Potatoes.....barrels..	228,095	2 00	456,190
Pork.....tierces and barrels..	276,606	16 00	4,425,696
Pork.....boxes..	303	35 00	10,605
Pork.....hhds..	2,478	80 00	198,240
Pork, in bulk.....pounds..	8,800,000	7	616,000
Porter and ale.....barrels..	406	10 00	4,060
Packing yarn.....reels..	2,093	7 00	14,651
Skins, deer.....packs..	998	25 00	24,950
Skins, bear.....packs..	16	15 00	240

TRADE OF NEW ORLEANS—Continued.

Articles.	Amount.	Average.	Value.
Shot.....kegs..	2,704	$25 00	$67,600
Soap.....boxes..	5,308	3 00	15,924
Staves.....M...	7,319	38 00	278,122
Sugar (estimated crop).....hhds..	236,547	50 00	11,827,350
Spanish moss.....bales..	4,372	8 00	34,976
Tallow.....barrels..	1,307	20 00	26,140
Tobacco, leaf.....hhds..	75,816	75 00	5,686,200
Tobacco, strips.....hhds..	11,741	125 00	1,467,625
Tobacco, stems.....hhds..	2,118	20 00	42,360
Tobacco, chewing.....kegs and boxes..	4,779	20 00	95,580
Twine.....bundles and boxes.	2,341	8 00	18,728
Vinegar.....barrels..	92	6 00	552
Whiskey.....barrels..	146,352	7 50	1,097,640
Window glass.....boxes..	19,251	2 50	48,127
Wheat.....barrels and sacks..	64,918	2 00	129,836
Other various articles, estimated at.....	.....	.....	5,500,000
Total value.....	.....	.....	108,051,708
Total in 1850–'51.....	.....	.....	106,924,083
Total in 1849–'50.....	.....	.....	96,897,873
Total in 1848–'49.....	.....	.....	81,989,692

Exports of Sugar and Molasses from New Orleans for the year ending 31st August, 1852.

Whither exported.	Sugar.		Molasses.	
	Hhds.	Barrels.	Hhds.	Barrels.
New York.....	18,225	134	130	26,703
Philadelphia.....	6,489	946	93	6,384
Charleston, S. C.....	3,524	1,685	.....	9,519
Savannah.....	729	99	.....	2,873
Providence and Bristol, R. I.....	.....	.....	319	143
Boston.....	611	21	.....	1,409
Baltimore.....	6,400	38	.....	11,681
Norfolk, Richmond, and Petersburg, Va.....	4,585	338	41	5,323
Alexandria, Va.....	1,156	.....	.....	2,127
Mobile.....	5,327	.....	.....	16,187
Appalachicola and Pensacola.....	1,399	416	.....	7,207
Other ports.....	2,348	2,857	.....	5,151
Total.....	50,793	6,534	583	94,107

Monthly arrivals of ships, barks, brigs, schooners, and steamboats at New Orleans from September 1, 1851, to August 31, 1852.

Months.	Ships.	Barks.	Brigs.	Schooners.	Steamships.	Total.	Steamboats.
September	31	21	12	43	14	121	140
October	74	32	26	51	18	201	186
November	107	26	19	44	14	210	194
December	105	66	41	77	14	303	293
January	69	39	29	55	13	205	297
February	95	33	30	70	18	246	285
March	74	29	30	64	20	217	365
April	59	27	24	76	24	210	290
May	92	32	26	60	17	227	242
June	59	30	21	55	24	189	238
July	20	21	17	41	19	118	127
August	22	15	12	37	18	104	121
Total	807	371	287	673	213	2,351	2,778

COMMERCE OF ST. LOUIS.

Statement of domestic produce and manufactures shipped from the port of St. Louis, destined to New Orleans, Natchez, Vicksburg, Memphis, Nashville, Mills's Point, Helena, and other places on the interior waters of the United States, in the year ending June 30, 1851.

Flour	648,520 barrels.	Lead	472,438 pigs.
Flour	2,156 sacks.	Lead	78,600 lb. bars.
Wheat	112,600 sacks.	Tobacco	9,210 hhds.
Oats	415,624 sacks.	Tobacco	5,011 boxes.
Barley	17,487 sacks.	Refined sugars	21,892 barrels.
Pork	108 hhds.	Sugars	21,405 hhds.
Pork	5,012 tierces.	Sugars	11,548 barrels.
Pork	122,948 barrels.	Molasses	40,510 barrels.
Lard	14,290 tierces.	Whiskey	29,916 barrels.
Lard	47,450 barrels.	Hides	33,490
Lard	19,730 kegs.	Nails	38,776 kegs.
Lard	421 tons.	Glass	6,418 boxes.
Beef	5,111 tierces.	Salt	16,753 barrels.
Beef	4,538 barrels.	Cotton yarn	6,180 bags.
Bacon	24,432 casks.	Wrought-iron manufactures	15,345 tons.
Bacon	6,986 tierces.	Castings	30,840 tons.
Hemp	57,160 bales.		

IMPORTS INTO THE PORT OF NEW YORK, 1851-'52.

Imports.		January 1 to August 31.	
		1852.	1851.
Brandy	½ pipes	10,843	10,716
Brandy	¼ casks and barrels	25,449	24,690
Coal	tons	49,450	37,743
Cochineal	ceroons	1,107	1,521
Cocoa	bags	4,725	7,719
Coffee	packages	445,989	392,210
Cotton	bales	397,856	313,890
Duck	bales	300	570
Duck	pieces	11,913	6,953
Earthenware	packages	25,604	28,119
Figs	drums, &c	14,314	56,024
Gin	pipes	3,162	3,255
Hemp	bales	47,063	42,563
Hemp	tons	268	774
Hides	bales	1,069	919
Hides	no	773,104	866,333
Iron (bar)	tons	26,096	37,952
Iron (pig)	tons	46,390	38,598
Iron (sheet, &c.)	bdls	372,910	479,429
Indigo	cases	1,258	1,614
Indigo	ceroons	881	656
Lead	pigs	268,743	328,264
Molasses	hogsheads	63,264	76,263
Molasses	tierces	4,916	5,088
Molasses	barrels	31,940	36,633
Olive oil	casks	747	1,338
Olive oil	boxes and baskets	36,820	19,997
Pepper	bags	23,414	2,884
Pimento	bags	10,950	6,027
Rags	bales	26,863	24,689
Raisins	casks	1,894	8,938
Raisins	boxes and frails	105,711	148,738
Raisins	drums	.....	960
Rice	tierces	28,910	28,859
Rum	puncheons	1,183	996
Salt	bushels	1,315,407	1,246,579
Saltpetre	bags	28,021	13,244
Sugar	hogsheads	157,886	133,082
Sugar	tierces	3,380	1,448
Sugar	barrels	34,627	31,379
Sugar	boxes	163,157	168,038
Sugar	bags	59,890	141,277
Spelter	plates	54,493	82,618
Tin (Banca, &c.)	slabs	25,393	13,268
Tin (plates)	boxes	226,152	230,363
Tobacco	hogsheads	10,603	9,454
Tobacco	bales and ceroons	24,550	15,434
Wines	butts and pipes	1,064	963
Wines	hhds. and ½ pipes	13,631	11,767
Wines	¼ casks	28,884	37,323
Wines	barrels	6,607	7,118
Wines	boxes	44,172	53,760
Wool	bales	11,757	37,153

THE FISHERIES.

The following table exhibits the United States tonnage employed in the fisheries, and the import and export of fish into and from the United States, for a series of years. The table shows the importance of the interests at stake upon the decision of the fish controversy. It is the mackerel fishermen who are more particularly interested in the recent policy of the British government:

Years.	Tonnage.			Imports.		Exports.	
	Cod.	Mackerel.	Total.	Dried.	Pickled.	Dried.	Pickled.
	Tons.	*Tons.*	*Tons.*	*Cwt.*	*Pounds.*	*Cwt.*	*Pounds.*
1840	60,035	28,629	104,304	4,061	25,493	211,425	42,274
1841	66,551	11,321	77,873	2,422	18,012	252,190	36,508
1842	54,804	16,096	70,900	1,265	14,678	256,083	40,816
1843	61,224	11,775	73,000	2,640	12,334	174,220	20,198
1844	85,224	16,170	101,395	360	43,542	271,610	43,500
1845	69,825	21,413	91,238	1,297	30,506	211,425	42,374
1846	72,516	36,453	108,978	865	31,402	277,401	56,331
1847	70,177	31,451	101,628	8,274	91,113	258,870	30,976
1848	82,651	43,553	126,210	51,896	122,594	206,549	22,445
1849	73,882	42,992	116,874	22,520	138,508	197,457	25,570
1850	93,886	58,112	151,918	25,115	108,380	168,600	19,330
1851	95,615	50,539	146,154	14,765	145,368	151,088	21,214

THE MARINE OF THE WORLD.

Number of vessels and tonnage belonging to the following countries, 1852.

Countries.	Tons.	Vessels.
Great Britain	4,144,115	34,090
France	595,344	13,679
Norway	337,058	3,064
Russia	.....	750
Greece	150,000	4,000
Naples	100,000	.....
Hamburg	82,053	286
Belgium	22,770	161
Cape of Good Hope	4,080	34
United States	3,535,451	.....
Netherlands	396,924	1,793
Austria	178,000	.....
Denmark and Duchies	168,978	4,710
Papal States	133,402	1,520
Canada	68,553	683
Ceylon	30,828	609
Mauritius	10,020	125
Tuscany	27,598	773
Prussia	133,658	977
Total	10,118,841	67,184

The shipping and tonnage entered inwards, and cleared outwards, from the following countries:

Countries.	Entered.		Cleared.	
	Tons.	Vessels.	Tons.	Vessels.
Great Britain	6,113,696	31,249	5,906,978	29,011
France	1,857,291	15,263	1,430,085	13,868
Netherlands	1,099,771	6,959	1,136,864	7,017
Hamburg	730,596	4,094	729,186	4,114
Canada	628,399	1,699	636,407	1,732
Spain	579,475	5,206	470,973	4,622
India	406,479	868	522,056	1,128
Prussia	813,096	4,690	823,456	4,635
United States	4,328,639	21,643	4,361,002	21,805
Russia	1,323,080	6,401	1,177,994	6,197
Norway	772,885	7,969	806,766	8,160
Sardinia	700,000	6,000	700,000	6,009
Austria	547,228	.....	562,722	.....
Sweden	540,902	6,707	562,394	6,347
Belgium	356,367	2,424	349,628	2,368
Egypt	409,156	2,019	432,696	1,707
China	169,155	531	163,717	528
Other countries	1,927,505	15,915	1,965,867	17,163
Total	23,333,620	139,638	22,738,801	136,402

EXPORTS OF BREAD-STUFFS AND PROVISIONS FROM NEW YORK.

The exports from New York of flour, wheat, corn, beef, pork, and lard, from 1st January to 31st December, 1852 and 1851, were as follows:

	1852.	1851.
Flour.....barrels...	1,304,226	1,269,619
Wheat.....bushels...	3,331,948	1,467,514
Corn	763,612	1,678,034
Rye	249,083	13,160
Beef.....barrels...	55,799	44,277
Pork	39,751	45,887
Lard.....kegs.....	98,282	121,379
Cheese.....100 lbs.	16,880	81,260
Butter	7,135	19,340

CHICAGO EXPORTS.

The Chicago *Democrat* has a very full statement of the business of that city for the past season. We gather from it the following figures, showing the amount of the articles specified sent east by lake and railroad:

	1851.	1852.
Wheat.....bushels...	436,808	399,410
Corn	3,221,317	2,329,649
Oats	767,089	1,598,164
Barley	8,537	136,817
Beef.....barrels..	49,306	46,728
Beef.....tierces....	2,829	.....
Pork.....barrels...	19,188	16,063
Flour	71,723	38,100

Of the following articles the comparison with last year is not given:

Butter	kegs	3,180
Hides	No.	20,008
High wines		4,023
Lead	tons	366
Lead	pigs	5,737
Lard	barrels	1,460
Reapers	No.	221
Salt	barrels	2,526
Skins	bales	277
Shoulders	tons	48
Wool	bales	933

STATEMENT OF BRIGHTON MARKET.

1852.

54,560 beef cattle; sales estimated at		$2,127,840
20,615 steers	do	494,760
252,595 sheep	do	694,595
86,350 swine	do	694,450
		3,921,645

1851.

53,020 beef cattle, 23,810 steers, 193,880 sheep, 50,830 swine.	Estimated sales	3,502,390

1850.

42,830 beef cattle, 27,820 steers, 46,170 sheep, 78,330 swine.	Estimated sales	2,989,902

NEW YORK CATTLE TRADE.

Comparative statement of beef cattle sold in the New York market during the years 1851 *and* 1852.

Months.	1852.			1851.		
	Beeves.	Cows and calves.	Sheep and lambs.	Beeves.	Cows and calves.	Sheep and lambs.
January	5,500	420	18,000	6,550	341	26,250
February	6,200	495	24,800	6,600	260	25,650
March	9,125	613	23,500	5,875	485	21,950
April	4,800	750	11,700	5,800	410	10,000
May	10,200	505	16,500	6,850	570	15,100
June	9,250	350	21,400	6,590	600	1,300
July	9,950	520	34,000	7,800	530	16,000
August	9,500	525	55,000	11,000	515	30,650
September	8,100	320	24,200	9,000	425	29,600
October	12,400	430	40,500	8,669	490	23,600
November	11,300	295	39,590	9,050	375	25,600
December	9,000	435	27,000	6,800	453	27,600
Total	105,225	5,688	323,000	88,994	5,406	264,200

These figures show, at a glance, the immense increase in the consumption of cattle in this city. The difference in favor of 1852 is as follows:

Increase over 1851.—Beeves, 16,231; cows and calves, 282; sheep and lambs, 58,900.

If we adopt $39 as an average price for beef cattle on the hoof, we arrive at a tolerably reliable estimate of the probable value of the most lucrative branch of the immense and growing trade. According to this showing, then, the sales of the year closing realized *four million ninety-eight thousand five hundred and fifty dollars*, which is an increase of $313,011 over the sales of 1851. There is an equally substantial increase seen in the sales and value of the other descriptions of cattle, as evidenced by the comparison below:

BEEVES.

Year.	Number sold.	Prices.	Increase for 1852.
1852....	105,225; average, $39 00.....	$4,103,975 00	.....
1851....	88,994; average, 39 00.....	2,470,961 00	.....
			$633,016 00

COWS AND CALVES.

1852....	5,688; average, $35 00.....	$196,080 00	.....
1851....	5,406; average, 35 00.....	170,343 00	.....
			$28,747 00

SHEEP AND LAMBS.

1852....	323,000; average, $4 50.....	$1,547,730 00	.....
1851....	264,200; average, 3 23.....	860,350 00	.....
			$937,080 00
	59,200		
	Excess in favor of 1852.....	.....	1,876,622 00

According to these figures, the total value of the cattle trade for the year is as follows:

Beeves - - - - - -	$4,103,972 00
Cows and calves - - - - -	199,080 00
Sheep and lambs - - - - -	1,477,730 00
Total - - - - -	5,780,782 00

If we include the sales of which, as above stated, no reliable estimate can be procured, it is probable that the value of the year's business would swell to *six millions of dollars.*

There is one branch of the cattle trade of this city not here taken into account—the traffic in hogs—in which there is a large amount of capital annually invested; but the places of sale are so numerous, and the statistics of trade so imperfect and unreliable, that we have not taken it into regular account. Many thousands are sold weekly, the supplies coming chiefly from New Jersey, Western New York, and Ohio.—*Courier and Enquirer.*

Statement of all the property which came to the Hudson river on the canals in the years 1851 and 1852, with the quantity and estimated value of each article in Albany and Troy.

Articles.	1851.		1852.	
	Quantity.	Value.	Quantity.	Value.
THE FOREST.				
Fur and peltry ..... pounds...	484,000	$605,200	264,652	$344,048
Product of wood.				
Boards and scantling..... feet.....	427,038,600	7,213,226	542,428,787	9,393,361
Shingles..... M.....	47,900	203,971	62,285	217,999
Timber..... cubic feet.	4,237,750	505,251	4,003,913	681,376
Staves ..... pounds...	155,304,000	737,686	145,503,656	683,790
Wood ..... cords...	8,726	53,591	17,446	87,233
Ashes (pot and pearl)..... barrels...	29,084	841,731	37,220	1,079,851
AGRICULTURE.				
Product of animals.				
Pork..... barrels .	45,019	663,898	72,704	1,267,292
Beef ..... barrels..	76,344	468,054	89,215	1,034,113
Bacon..... pounds..	10,904,000	986,956	9,754,790	916,950
Cheese ..... pounds .	25,602,000	1,663,606	16,367,404	1,310,351
Butter..... pounds..	9,568,000	1,338,997	7,902,715	1,463,532
Lard..... pounds..	10,814,000	973,324	.....	.....
Lard oil..... gallons..	240,800	168,537	.....	.....
Wool..... pounds..	10,518,000	4,101,415	7,645,302	3,210,899
Hides..... pounds.	572,000	68,434	763,511	105,297
Tallow..... pounds..	244,000	16,976	.....	.....
Lard, tallow, and lard oil.. pounds..	.....	.....	10,672,731	1,173,712
Vegetable food.				
Flour ..... barrels..	3,358,463	13,436,542	3,464,108	15,685,965
Wheat..... bushels.	3,163,666	3,051,110	6,754,946	6,878,291
Rye..... bushels.	288,679	186,986	279,314	223,451
Corn..... bushels.	7,915,464	4,427,175	5,411,643	3,626,535
Corn meal..... barrels..	7,065	20,172	14,174	39,688
Barley ..... bushels.	1,809,417	1,429,332	2,280,485	1,664,754
Oats..... bushels.	3,594,313	1,348,019	4,857,487	2,136,290
Bran and ship stuffs..... pounds.	44,636,000	352,285	59,727,165	542,644
Peans and beans..... bushels.	127,500	141,698	122,489	149,996
Potatoes ..... bushels.	599,950	341,531	779,871	441,300
Dried fruit..... pounds.	1,424,000	114,108	190,504	15,241
All other agricultural products.				
Cotton..... pounds.	220,000	23,994	148,618	16,254
Unmanufactured tobacco ... pounds.	3,702,000	813,712	12,216,228	2,687,570
Hemp ..... pounds.	1,160,000	75,469	1,403,122	91,203
Clover and grass seed..... pounds.	534,000	39,876	2,150,075	161,275
Flax seed..... pounds	122,000	2,426	2,125,809	42,517
Hops..... pounds.	552,000	146,287	417,131	124,769

STATEMENT—Continued.

Articles.	1851.		1852.	
	Quantity.	Value.	Quantity.	Value.
MANUFACTURES.				
Domestic spirits.....gallons.	2,787,600	$627,406	4,617,658	$1,040,355
Beer.....barrels.	56	315	.....	.....
Oil, meal, and cake.....pounds.	6,810,000	85,150	9,256,769	120,264
Starch.....pounds.	2,560,000	135,732	.....	.....
Leather.....pounds.	8,204,000	1,230,384	6,877,815	1,100,644
Furniture.....pounds.	1,046,000	104,385	1,263,466	126,346
Agricultural implements....pounds.	320,000	15,842	.....	.....
Bar and pig lead.....pounds.	36,000	820	11,155	563
Pig iron.....pounds.	5,916,000	59,158	5,213,514	54,836
Castings.....pounds.	2,448,000	73,438	3,056,428	108,887
Machines and parts thereof..pounds.	148,000	14,931	.....	.....
Bloom and bar iron.....pounds.	33,350,000	666,993	14,854,547	235,477
Iron ware.....pounds.	4,000	111	.....	.....
Domestic woollens.....pounds.	824,000	725,419	187,653	176,270
Domestic cottons.....pounds.	2,248,000	539,312	1,342,122	348,951
Domestic salt.....pounds.	12,816,000	56,387	9,265,929	41,697
Foreign salt.....pounds.	.....	.....	3,000	14
MERCHANDISE.....pounds.	9,169,000	329,423	21,213,199	3,749,824
OTHER ARTICLES.				
Live cattle, hogs and sheep.pounds.	868,000	26,100	150,119	4,504
Stone, lime, and clay.....pounds.	86,286,000	122,000	113,497,267	156,569
Gypsum.....pounds.	3,242,000	6,475	11,270,138	22,541
Eggs.....pounds.	3,676,000	220,652	.....	.....
Mineral coal.....pounds.	26,110,000	58,753	14,820,600	37,052
Fish.....pounds.	170,000	7,101	.....	.....
Copper ore.....pounds.	418,000	62,667	54,697	8,204
Sundries.....pounds.	110,392,000	2,202,985	105,727,204	2,060,557

RECAPITULATION.

	1851.		1852.	
	Tons.	Value.	Tons.	Value.
Forest.....	913,268	$10,160,656	1,064,677	$12,487,658
Agriculture.....	891,420	36,394,913	989,268	45,009,889
Manufactures.....	52,302	1,335,783	47,512	3,356,304
Merchandise.....	4,580	329,423	10,605	3,749,824
Other articles.....	115,581	706,733	122,760	2,289,427
	1,977,151	53,927,508	2,234,822	66,893,102

The number of tons going *from* tide-water in 1852 was as follows, viz:

Cleared at—	Merchandise.	Furniture.	Other articles.	Total tons.	Value.
	Tons.	Tons.	Tons.		
New York	131,877	15	9,702	141,594	$46,966,227
Albany	123,407	242	49,889	173,538	31,281,301
West Troy	140,305	175	64,542	205,022	40,521,355
Schenectady	498	207	668	1,373	127,561
Total 1852	396,087	639	124,801	521,527	118,896,444
Total 1851	349,230	1,465	124,640	475,335	89,217,789
Increase	46,887	....	161	46,192	29,678,655
Decrease	....	826	....	....	....

Aggregate statement of the tonnage and value of the property which came to and went from the Hudson river on the canals in the years 1851 *and* 1852.

Years.	Tons.	Value.
1852	2,756,349	$185,789,546 00
1851	2,452,486	143,145,297 00
Increase	303,863	42,644,249 00

TRADE OF CINCINNATI.

We are indebted to the Cincinnati Price Current for the following statistics:

IMPORTS INTO CINCINNATI.

Commencing September 1, 1852, and the same time in 1851.

Articles.	Past week.	Totals.	Last year.
Apples, green.....barrels....	332	11,081	27,467
Beef.....	15	513	1,146
Beef.....tierces	.....	219	1,060
Bagging.....pieces.....	.....	4	.....
Barley.....	1,646	90,193	115,832
Beans.....	685	17,771	4,932
Butter.....barrels ..	812	6,265	3,443
Butter.....firkins and kegs..	353	9,066	8,288
Blooms.....tons.....	.....	1,434	674
Bran, &c.....sacks.....	872	33,994	57,336
Candles.....boxes.....	.....	49	70
Corn.....bushels....	6,838	228,305	263,290
Cornmeal.....	40	6,798	2,556
Cider.....barrels...	19	761	828
Cheese.....casks.....	3	52	27
Cheese.....boxes	4,809	139,805	164,764
Cotton.....bales.....	423	5,652	3,920
Coffee.....sacks.....	1,039	48,065	29,015
Codfish.....drums.....	7	556	88
Cooperage.....pieces	6,027	97,383	76,212
Eggs.....boxes and barrels..	205	2,584	439
Flour.....barrels....	9,903	197,653	177,707
Feathers.....sacks.....	54	4,771	2,322
Fish, sund.....barrels.....	301	5,386	7,066
Fish.....kegs and kits..	139	1,432	384
Fruit, dried.....bushels ...	802	12,907	8,405
Grease.....barrels....	5	643	345
Glass.....boxes.....	1,018	19,404	22,229
Glassware.....packages...	1,013	14,963	13,350
Hemp.....bundles and bales..	115	6,243	4,392
Hides, loose.....	769	13,121	9,713
Hides, green.....pounds...	1,300	17,695	51,620
Hay.....bales	98	1,099	2,524
Herring.....boxes....	.....	7,357	1,985
Hogs.....heads....	9,964	192,281	106,662
Hops.....bales	126	1,756	1,173
Iron and steel.....pieces.....	3,553	110,172	55,131
Do.....bundles....	1,279	30,045	15,937
Do.....tons.....	137	2,197	4,023
Lead.....pigs.....	.....	19,691	20,075
Lard.....barrels....	2,408	16,979	7,557
Do.....kegs.....	2,706	6,915	4,964
Leather.....bundles....	286	7,470	3,574
Lemons.....boxes.....	.....	1,561	311
Lime.....barrels....	125	24,594	22,071
Liquors.....hhds. and pipes..	36	1,636	407
Merchandise and sundries.....packages...	18,400	358,923	40,805
Do.....tons.....	.....	410	1,091
Molasses.....barrels....	7,211	29,704	18,494
Malt.....bushels ...	.....	20,856	13,642
Nails.....kegs	,031	41,147	18,308
Oil.....barrels....	178	3,201	2,267
Oranges.....boxes and barrels..	119	342	340

TRADE OF CINCINNATI—Continued.

Articles.	Past week.	Totals.	Last year.
Oakum.....bales.....	.....	1,959	473
Oats.....bushels...	6,226	84,644	47,545
Oil cake.....pounds...	.....	14,000	6,000
Pork and bacon.....hhds.....	386	6,734	2,408
Do.....tierces.....	.....	571	35
Do.....barrels....	1,293	14,537	5,025
Pork, in bulk.....pounds....	624,005	4,281,392	1,386,216
Potatoes.....barrels....	425	6,884	5,959
Pig metal.....tons.....	137	9,267	4,517
Pimento and pepper.....bags.....	68	2,518	223
Rye.....bushels....	74	11,769	17,017
Rozin, &c.....barrels....	124	5,225	3,490
Raisins.....boxes.....	770	13,266	13,238
Rope, twine, &c.....	6	2,179	249
Rice.....tierces....	88	949	172
Sugar.....hhds.....	1,333	9,234	4,637
Do.....barrels....	14	6,899	4,283
Do.....boxes.....	25	975	1,090
Seed, flax.....barrels....	458	24,828	17,970
Do. grass.....	834	6,290	2,071
Do. hemp.....	.....	34	25
Salt.....sacks.....	5,500	43,782	11,410
Do.....barrels....	2,347	35,005	21,263
Shot.....kegs.....	.....	703	683
Tea.....packages...	558	11,183	4,049
Tobacco.....hhds.....	15	2,861	1,514
Do.....bales.....	12	1,034	447
Do.....boxes and kegs..	895	20,329	8,712
Tallow.....barrels....	138	2,375	1,068
Wines.....barrels and ¼ casks..	237	3,412	456
Do.....baskets and boxes...	534	3,187	1,377
Wheat.....bushels...	2,224	169,214	169,754
Wool.....bales.....	38	2,305	672
Whiskey.....barrels....	5,284	94,563	88,147
Cotton yarn.....packages...	148	2,097	2,182
Do.....bales.....	.....	29,140	28,356

EXPORTS FROM CINCINNATI.

Commencing September 1, 1852, *and same time in* 1851.

Articles.	Past week.	Totals.	Last year.
Apples, green.....barrels....	239	3,283	5,908
Alcohol.....	73	3,414	2,306
Beef.....	1,187	14,178	9,112
Do.....tierces.....	664	8,678	2,135
Beans.....barrels....	122	2,340	1,228
Brooms.....dozen.....	105	4,267	1,683
Butter.....barrels....	166	1,666	802
Do.....firkins and kegs..	765	17,784	10,582
Bran, &c.....sacks.....	781	6,191	.....
Bagging.....pieces.....	128	4,457	3,953
Corn.....sacks.....	.....	20,486	16,251
Corn meal.....barrels....	.....	108	162

TRADE OF CINCINNATI—Continued.

Articles.		Past week.	Totals.	Last year.
Cheese	casks		8	8
Do	boxes	2,144	84,581	68,394
Candles	boxes	4,805	45,520	33,477
Cattle	heads		294	
Cotton	bales	100	3,686	2,136
Coffee	sacks	652	24,094	12,148
Cooperage	pieces	2,432	68,898	25,138
Eggs	barrels	215	1,658	759
Flour	barrels	14,631	164,941	103,352
Feathers	sacks	241	4,565	2,429
Fruit, dried	bushels	475	2,426	173
Grease	barrels	120	1,586	1,054
Grass seed	barrels	74	2,124	849
Horses	heads	7	623	95
Hay	bales	50	237	117
Hemp	bales	18	1,397	476
Hides	pounds		5,235	19,924
Do	No	117	11,478	4,789
Iron	pieces	4,047	75,529	35,907
Do	bundles	1,120	19,073	9,868
Do	tons	98	4,572	2,532
Lard	barrels	5,896	22,872	12,767
Do	kegs	13,381	58,997	32,311
Lard oils	barrels	861	8,189	6,395
Linseed oil	barrels	46	3,267	2,408
Molasses	barrels	1,617	15,582	8,952
Oil cake	tons	260	1,843	377
Oats	sacks	60	1,600	1,038
Potatoes	barrels	499	7,155	6,021
Pork and bacon	hhds	1,095	9,291	5,722
Do	tierces	1,236	4,816	2,750
Do	barrels	13,142	62,373	33,291
Pork	boxes		92	410
Do. in bulk	pounds	69,600	382,037	804,785
Rope, &c	packages	348	5,703	1,860
Soap	boxes	434	12,132	8,771
Sheep	heads		60	
Sugar	hhds	726	7,412	3,712
Salt	barrels	719	18,714	11,274
Do	sacks	917	19,819	8,316
Seed, flax	barrels	27	1,952	547
Sundry merchandise	packages	11,500	377,428	93,202
Do. merchandise	tons	50	3,344	2,439
Do. liquors	barrels	1,851	22,194	10,127
Do. manufactures	pieces	1,260	38,084	
Do. produce	packages	660	12,406	24,253
Starch	boxes	668	7,512	5,171
Tallow		171	2,495	2,103
Tobacco	kegs and boxes	406	14,088	7,088
Do	hhds	5	2,662	1,161
Do	bales		173	37
Vinegar	barrels	106	3,142	1,207
Whiskey	barrels	3,554	90,818	71,305
Wool	bales	132	4,886	1,017
Do	pounds		1,541	
White lead	kegs	154	25,662	17,092
Pieces castings		447	22,588	4,464
Do	tons	27	677	453

IX.

THE COTTON TRADE.

BY C. F. M'CAY, UNIVERSITY OF GEORGIA.

The course of the cotton trade during the past year has been steady and uniform. The season opened in September and October at rates a trifle higher than were realized in December; but, from January forwards, the market slowly advanced until it is now a little higher than it was a year ago. The price at Liverpool of fair cotton, on the 1st of September, 1851, was 5⅛*d.*; in October it was 5¼*d.*; in January, 5*d.*; in March, 5⅛*d.*; in May, 5¼*d.*; in July, 5⅜*d.*; and 6*d.* in September, 1852. The increased estimates of the crop depressed the price early in the season; but the immense consumption in every part of the world—in the United States, in England, and on the Continent—encouraged the sellers to demand higher rates; and these have been maintained in spite of the promise of another large crop for the ensuing year. The rates now current are not high; but they are above the average. For the thirteen years from 1840 to 1852, the whole American exports, (see Table I, at the end of this article,) amounting to nearly ten thousand millions of pounds, have been sold at an average price of eight and a half cents. The price of good middling, at Charleston, is now, October 29th, nine and a half cents. Instead of declining below the usual rates, the market has advanced, after receiving the largest crop ever produced, and with the prospect of another fully as large. What has maintained these prices? Are the causes temporary or permanent? Will they continue for the present year? Or is their effect already past? In attempting an answer to these questions it may be remarked:

1st. That the advance is not due to the fact that lower rates are not remunerative. From 1840 to 1844, when the average (see Table I) was only eight cents, the stocks were constantly increasing. The production outrun the consumption. This led to lower prices, which discouraged planting, and at the same time increased the demand of the manufacturers. From 1845 to 1849 the average price (see Table I) was only seven and a half cents. The surplus stocks then became small and prices advanced. Thus it appeared that an average of eight cents, from year to year, stimulated production so that the supply exceeded the demand, while seven and a half cents produced an opposite effect. The present rates, therefore, are more than sufficient to pay the planter a proper profit on his investment. And the general advance on land and negroes, throughout the Southern States, confirms the conclusion

thus indicated by the rise and the decline of the stocks lying over from year to year. The present prices will not only pay the cost of production, but allow a handsome profit to the producer. But—

2d. The price has been kept up during the past year, in part, by a high rate of exchange. A rise of one per cent. in exchange is nearly equal to one eighth of a cent in the price of cotton. The advance in exchange has been about two per cent. over the rates which were current before the discovery of California gold. We were then both exporters and importers of the precious metals. When we were sending them abroad the price of exchange was the real par, *plus* the freight, insurance, and other expenses of exportation. When we were receiving them the price was the real par, less these expenses. The highest rates were 111 or 112; the lowest, 104 or 105; the average was about 108 for sixty-day bills. For the past two or three years we have always been exporters of gold, and the range of exchange has been from 108 to 112, at New York, seldom going down to 108 or rising to 112—the average being about 110. This rise in exchange, on account of our owning the gold mines of California, is a permanent cause; exchange will be, hereafter, the real par, *plus* the cost of exporting specie, and not the real par sometimes increased, but sometimes decreased, by the cost of exportation. This is equivalent to an advance of one-fourth of a cent in every pound of cotton, and, for the year past, it produced to the South not less than three millions of dollars. This, though a true cause for an advance in the price of cotton, is not sufficient to account for the whole rise. Another cause may probably be—

3d. The increased supply of the precious metals, which, by expanding the currency, tends to raise the money-price of all other articles of merchandise. The large additions of gold to the currency of the world must, by inevitable necessity, produce an effect of this kind. No arithmetic can calculate its exact amount in a short period of time; but that it is producing, and must produce, hereafter, a slow, continued rise in all kinds of property, no one can possibly doubt. Its first effect is to raise the price of silver; but it is impossible, while the present laws regulating the comparative value of silver and gold at the mints of the world continue unchanged, to raise the premium on silver beyond a very small amount. The effect of a slight advance is to push aside the silver and to introduce gold in its stead. Thus, in our own domestic currency, silver is passing out of general circulation, and the vaults of the banks are filling with gold in its place. In France the coinage of gold has of late increased very largely: and so in other countries where both metals are a legal tender. This expansion of the metallic currency gives the banks an opportunity to increase their circulation, and thus the whole monetary medium, by which all the exchanges of commerce are made, becoming enlarged, the price of all other articles cannot fail to advance. It is impossible to say how large an influence this may have had in the recent high prices of cotton. It is not probably large, but that it is real no one can doubt.

4th. Another cause which has helped to sustain prices—and probably this is more potent than all the others together—is the successful despotism of Louis Napoleon in France, and of the crowned heads on the Continent of Europe. The order that has reigned in Paris and throughout France has given confidence to the merchant and the manufacturer,

encouraged labor and industry, given security to property, and stimulated production and consumption in every department of business. Similar causes have been operating in the German and Italian States. The triumph of law and order over the revolutionists of 1848 was not complete until the present year. The iron heel of arbitrary power had crushed the external manifestations of resistance, but the murmurs of discontent were still audible, and the hopes of liberty were not yet extinguished. The present year has witnessed the end of all these things. Lombardy and Hungary kiss the rod of the oppressor. French soldiers preserve quiet at Rome. The patriots of Naples and Sicily are in prison or in exile. An Austrian army has quelled the disturbances in Baden, Hamburg, Schleswig-Holstein. Revolution, anarchy, socialism, red-republicanism, exist no more. Men have turned their attention to trade, to labor, to the pursuits of peace. Instead of political agitation, the people are employing themselves in new enterprises of industry, of commerce and manufactures. The consumption of cotton in France has, in consequence, outrun any former year. Though stationary for many years past, the demand has suddenly awakened to new life; and so, also, in all the disturbed parts of Europe.

5th. The low price of grain in England, the successful working of free trade, and the prosperity in every department of manufactures, have stimulated the home demand in Great Britain to an extraordinary extent. The exports of cotton fabrics have been encouraged by the peace and prosperity of every part of the world. The overthrow of Rosas has opened the La Plata and its tributaries to British commerce. The outbreak in Caffraria is unimportant. The war in Burmah, being out of India proper, has no influence on trade. The rebellion in China does not disturb the exchanges at the free ports. So that universal peace may be said to prevail.

6th. In the United States the onward march of the cotton manufacture has again been resumed. The tariff of 1846, and the high price of the raw material, had checked the demand for the past three years; but the progress of our country in population, wealth, and enterprise, has surmounted these obstacles, and our course has again been forward.

Of these several causes, now enumerated to explain the fair price of cotton for the past year in the face of the abundant supply, there is not one which is not likely to operate for the coming year. We may, therefore, in considering the supply and demand for 1853, anticipate full average prices. They cannot be high, for the supply will be too large to permit any check in consumption. They cannot fall even to the average, for the stocks are low, and any further decline would stimulate the demand even beyond its present extraordinary amount.

The supply from the United States will probably exceed the large crop of 1852. The increased number of hands, the large breadth of land planted in cotton under the stimulus of good prices, the favorable character of the season, the fine weather for gathering the crop after the 1st of October, and the lateness of the frost, will tell strongly in favor of a large production. We have, indeed, had two severe storms, and with one of them a flood, but their injury has not been serious. The rot, also, has prevailed to an uncommon extent. The boll-worm has been very general, and in some places severe. The caterpillar has done some harm; but, beyond eating the leaves from the stalk, its ravages have been

local and unimportant. These causes have not produced as much injury as was suffered last year. This is especially true in the Atlantic States. The excessive drought inflicted then more damage than all the opposing causes of the present season. The receipts at Charleston and Savannah will therefore exceed those of last year; they will also be increased by the extension of the Georgia railroad further to the west. Instead of 800,000 bales received last year, 900,000 may confidently be anticipated for 1853. In Florida the storm of October 9 did such serious injury that we may expect a falling off in the receipts at Appalachicola and St. Mark's. More of this cotton will go to Savannah than usual; and the loss from the caterpillar and boll-worm has been considerable. But the increased planting will go far to balance these deficiencies, and only a slight decline may be looked for. From Alabama the receipts will be larger than last year. There was then too little rain; now there has been too much. The river lands produced finely last season; now it is the sandy uplands that are white with abundance. Only a small increase, however, may be anticipated. From the various districts that send their cotton to New Orleans the reports are contradictory. The Red river lands are doing very well; the parishes of Louisiana have been injured by the worm; the bottoms of the Mississippi have been too wet; the frost has kept off to a very late period in Tennessee; the planting has been large; the season for gathering long; and nearly the same amount will probably be received as for the past year. From Texas the reports have been very favorable; and an increase of twenty-five per cent may be looked for with confidence. The whole crop of American cotton for 1853 may be estimated (see Table II) at 3,100,000 bales.

The exports from the East Indies have fallen off largely the last year on account of the moderate prices. This has been the uniform effect of a declining market, and we may look with confidence for the same result hereafter. There is in India an immense production of cotton for domestic use; it has been stated to be as large as the crop in the United States; but no satisfactory statistics have ever been collected to show its actual amount; it is, however, very large, and a high price in Europe attracts a large portion for foreign export. It may then be brought further from the interior, and pay a larger charge for freight. On the contrary, when the European rates decline, the inferior character of the cotton, the heavy expense for freight and insurance for the long voyage, leave but a small balance for the first cost of production, and the carriage from the interior to the seaport. The circle around the marts of export is thus narrowed, and the amount sent off decreases. Thus the high prices of 1850 and 1851 raised the English imports to 308,000 and 329,000 bales, against 182,000 in 1849. The moderate prices of the present year have caused the imports at Liverpool to fall off near 100,000 bales, (see Table III.) The low rates current in December and January last diverted much of the East India cotton intended for export to China; and the European receipts have been small. No increase in these can be expected for 1853, since prices promise to be moderate, as they have been for the last season.

The imports into England from Egypt have increased largely for the past year. The largest amount ever before received was 82,000 bales in 1845; the average for the last three years has been 73,000. But for 1852 the receipts at Liverpool alone on the 8th of October had reached

142,000 bales. Less than usual has been carried to France; and so large an amount for England cannot be anticipated for the coming year, especially as the stocks in Liverpool of Egyptian cotton have advanced 50,000 bales. From Brazil and other places the Liverpool receipts have increased slightly over last year—namely, from 90,000 to 103,000 bales; they are, however, less than for the two preceding years. The average from Egypt and Brazil for the last four years has been about 250,000 bales, (Table IV,) and this amount may be looked for in 1853.

The total supply from all these places for 1853 may be estimated (Table V) at 3,550,000, or about the same as last year. This is 685,000 bales larger than for 1851, and 500,000 larger than for 1849. But as the increased demand has taken off the whole of the larger production of 1852 at moderate prices, leaving the stocks now smaller than they have been for many years past, (Table VI,) there is nothing in this large supply calculated to depress prices.

In considering the consumption, we notice everywhere a large increase not only over last year, but over every former year. The amount consumed in Great Britain in 1851 was 1,663,000 bales, while the largest figures for any previous year were 1,590,000 bales. The deliveries to the trade this year at Liverpool, (see Table VII,) where 95 per cent. of all the English sales are made, exceed those of last year more than 8,000 bags per week; as the factories are now well supplied, this excess will scarcely continue until the 31st of December. But the great regularity in the deliveries forbids any material decline. If the future purchases of the trade should not exceed those of the same period for last year, the consumption of Great Britain would reach 1,992,000 bales for 1852; nor can we anticipate any less for 1853. The abundance of money, the favorable harvest, the great demand for labor, the high wages in all branches of manufactures, the advance in iron, the prosperity of the shipping interest, the large influx of Australian gold, the universal prevalence of peace in every part of the civilized world, the new machinery erected during the last year, the moderate rates which the raw material promises to bear, the low stocks of goods in the hands of the manufacturers, the large decline in the import of wool, and its consequent anvance in price, and the general prosperity, both in the domestic and the export trade, authorize the expectation of a still larger consumption for 1853. There is not a single drawback to this anticipation except the chapter of accidents; but it may be safest, as the increase for the last year has been so unprecedented, to look forward to a demand only as large as for the present year.

The consumption in France has increased as rapidly as in England. Our exports thither have been 120,000 bales larger than last year, and they have caused no accumulation of stocks either at Havre or at Marseilles. The deliveries at Havre alone have increased (see Table VIII) more than 80,000 bales, and the amount of American cotton for the whole of France will probably exceed 400,000 bales, against 310,000 for 1851. As large a demand for 1853 may be confidently anticipated.

On the Continent of Europe the consumption has been steadily increasing. Its progress is occasionally checked by high prices, but these are only temporary disturbances in its onward march. In Russia the imports for the three years from 1841 to 1843 were 337,000 cwt.; from 1844 to 1846, they were 584,000; and from 1847 to 1849, they were 1,065,000.

In the German Zollverein the protective duties they imposed have given ample encouragement to the home manufacture of cotton goods. The English and American exports of raw cotton to these and other Continental States have averaged (see Table IX) 417,000 bales in 1847 and 1848; 522,000 in 1849 and 1850; and 582,000 in 1851 and 1852. For the incoming year they will almost certainly reach 600,000 bales, which is a trifle less than the amount for the present season.

The consumption of the United States has made a most sudden and rapid advance during the past year. For the three preceding years we had gone backwards. The high price of the raw material, and the imports of cotton goods at low duties from abroad, had given a check to our increasing demand, such as we never before had experienced. Hitherto our progress had been uniformly onward. The rapid increase in our own population and wealth forbids any retrogade movement in the regular operations of business. Just as our railroads, our shipping, our crop of cotton, or of wheat, or of corn, make steady and invariable progress from year to year, so must our cotton manufactures. There will be at times a backward step in this movement, but it is temporary and brief. It is like the oscillation of a pendulum on a moving surface, the weight swings backwards and forwards, but the onward motion of the point of support makes it certain that the forward oscillations will more than compensate for the backward movements. The present prosperity of the country authorizes us to expect an advance even on the large consumption of the past season. The amount for 1852 has reached (see Table X) 603,000 bales, and 625,000 may be anticipated for the coming year.

The whole demand for 1853 will then be estimated at 3,625,000 bales, (Table XI,) which is 75,000 more than the anticipated supply, (Table V.) Now, as the stocks on hand (Table VI) are at present very low, lower than they have been for years past, especially if the time for which they would supply the demand be considered, it would seem that prices must keep above their usual average. This has been 8½ cents (Table I) at the seaports for the last thirteen years; and if the influence of a high rate of exchange and the abundance of gold are to be regarded as real causes for elevating the money value of cotton in our markets, it would seem probable that the present prices (9½ cents at Charleston, October 29th, for good middling) will be fully maintained, and that an advance, rather than a decline, may be expected.

TABLE I.—*American Exports—value and price.*

[From Hunt's Merchants' Magazine.]

	Total exports in pounds.	Total value.	Price.
From 1840 to 1844 - -	3,340,000,000	$267,200,000	8 cts.
From 1845 to 1849 - -	3,788,000,000	284,400,000	7.5 "
From 1850 to 1851 - -	1,563,000,000	184,300,000	11.8 "
Estimated for 1852 - -	1,000,000,000	90,000,000	9 "
From 1840 to 1852 - -	9,691,000,000	825,900,000	8.5 "

TABLE II.—*Crop of the United States.*

	Receipts.		Estimate.	
	1849.	1851.	1852.	1853.
	Bales.	Bales.	Bales.	Bales.
Texas - - -	39,000	46,000	64,000	80,000
New Orleans -	1,094,000	933,000	1,373,000	1,350,000
Mobile - - -	519,000	452,000	549,000	560,000
Florida - - -	200,000	181,000	189,000	175,000
Georgia - - -	391,000	322,000	326,000	400,000
South Carolina	458,000	387,000	477,000	500,000
Other places -	28,000	34,000	37,000	35,000
Total - -	2,729,000	2,355,000	3,015,000	3,100,000

TABLE III.—*Imports from the East Indies.*

Years.	Bales.	Remarks.
1830 to 1834, average for 5 years -	81,000	Low prices.
1835 to 1839, " " -	144,000	High prices.
1840 to 1844, " " -	232,000	Chinese war.
1844 to 1849, " " -	177,000	Peace and low prices.
1849, October 5, Liverpool only -	69,000	Low prices.
1851, " 10, " " -	171,000	High prices.
1852, " 8, " " -	75,000	Moderate prices.
1849, whole year, Great Britain -	182,000	Low prices.
1851, " " " -	329,000	High prices.
1852, " estimate -	200,000	Moderate prices.
1853, " " -	200,000	Moderate prices.

TABLE IV.—*English Imports from Egypt, Brazil, etc.*

Years.	Liverpool, about 1st October.	Great Britain, whole year.
	Bales.	Bales.
1846	121,000	153,000
1847	75,000	136,000
1848	94,000	137,000
1849	178,000	245,000
1850	205,000	257,000
1851	138,000	181,000
1852	245,000	
1853, estimated	- - - -	250,000

TABLE V.—*Supply of* 1851, *and estimate for* 1852 *and* 1853.

	1851.	1852.	1853.
	Bales.	Bales.	Bales.
Crop of the United States	2,355,000	3,015,000	3,100,000
English imports from East Indies	329,000	200,000	200,000
English imports from other places	181,000	300,000	250,000
Total from these sources	2,865,000	3,515,000	3,550,000

TABLE VI.—*Stocks at recent dates corresponding to the close of our year.*

	1849.	1850.	1851.	1852.
	Bales.	Bales.	Bales.	Bales.
United States, Sept. 1	155,000	168,000	128,000	91,000
Liverpool, Oct. 8	582,000	545,000	550,000	507,000
Havre, Oct. 6	45,000	32,000	33,000	34,000
Total	782,000	745,000	711,000	632,000

TABLE VII.—*Deliveries to the Trade at Liverpool.*

	1849.	1851.	Weekly consump'n.	1852.	Weekly consump'n.
	Bales.	Bales.	Bales	Bales.	Bales.
May 1 - -	532,000	427,000	25,100	630,000	37,100
June 4 - -	688,000	619,000	28,100	870,000	39,500
July 2 - -	835,000	744,000	28,600	1,001,000	38,500
August 1 -	993,000	887,000	29,600	1,156,000	38,500
September 3 -	1,141,000	1,058,000	30,200	1,340,000	38,300
October 1 -	1,220,000	1,167,000	29,900	1,475,000	37,800
October 8 -	1,287,000	1,191,000	29,800	1,520,000	38,000
Whole year -	1,467,000	1,576,000	30,315	.....	.....
Do. G. Brit'n	1,590,000	1,663,000	32,000	2,000,000*	39,000*

* Estimated.

TABLE VIII.—*Deliveries to the Trade at Havre.*

	1850.		1851.		1852.	
	All kinds.	U. States.	All kinds.	U. States.	All kinds.	U. States.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
September 1	232,000	220,000	224,000	211,000	300,000	290,000
October 1 -	250,000	238,000	246,000	234,000	327,000	316,000
Whole year -	306,000	294,000	312,000	302,000	.....	.....

TABLE IX.—*Consumption out of England, France, and United States.*

Years.	American exports.	English exports.	Total.
	Bales.	Bales.	Bales.
1847 - - - - - -	169,000	215,000	384,000
1848 - - - - - -	255,000	192,000	447,000
1849 - - - - - -	322,000	254,000	577,000
1850 - - - - - -	194,000	272,000	466,000
1851 - - - - - -	269,000	269,000	538,000
1852 - - - - - -	354,000	*203,000	†625,000

*October 8. †About.

TABLE X.—*American Consumption.*

Years.	North of Richmond.	Average for three years.	Increase, per ct.	South of Richmond.	Total.
	Bales.	Bales.		Bales.	Bales.
1847 - -	428,000	413,000	.....	80,000	508,000
1848 - -	532,000	461,000	11+	90,000	622,000
1849 - -	518,000	493,000	7+	100,000	618,000
1850 - -	487,000	512,000	4+	100,000	587,000
1851 - -	404,000	470,000	8—	100,000	504,500
1852 - -	603,000	498,000	6+	100,000	703,000

TABLE XI.—*Consumption of the World.*

	Result for—		Estimate for—	
	1850.	1851.	1852.	1853.
	Bales.	Bales.	Bales.	Bales.
Great Britain - -	1,514,000	1,663,000	2,000,000	2,000,000
United States - -	487,000	404,000	603,000	625,000
France, of U. States -	300,000	310,000	400,000	400,000
Exports from Great Britain and U. States -	562,000	538,000	625,000	600,000
Total - - -	2,863,000	2,915,000	3,628,000	3,625,000

Acknowledgment of seeds received from the gentlemen named below:

J. L. Hendrick, esq., of Litchfield, Connecticut, potato seed, lettuce, and sweet corn. The potato seed is from the Mercer variety, which Mr. H. says is less subject to rot than formerly, when, for a few years, the plant failed to form seeds, apparently from constitutional debility. The sweet corn is thought to be an improved kind, and the lettuce is also said to be superior.

J. B. Gray, esq., of Fredericksburg, Virginia, seed of a variety of asclepias.

Captain R. B. Marcy, U. S. A., seed of Gama grass, from the head-waters of Red river. [The seed of this grass is in great request, and we should be happy to obtain more of it for distribution.]

Mr. A. Z. V. Purdy, esq., of Trinity Springs, Martin county, Indiana, sample of wheat.

Warren & Co., Sacramento, Cal., Italian wheat, flower seeds, &c.

James S. Wilson, esq., Washington, D. C.

A. H. Ernst, esq., of Cincinnati, Japan peas.

Ewe one
Sheared 18?

Patterson of Westfi